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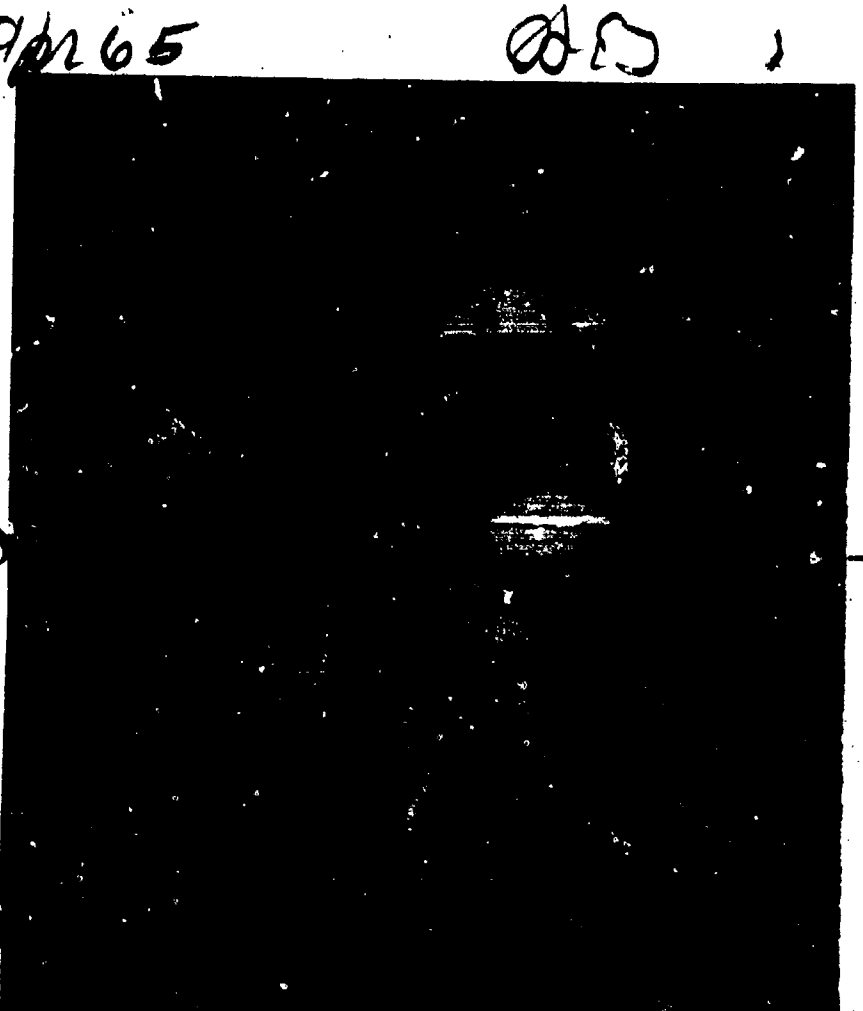
LAND DECONTAMINATION TEST

DPGR 109

RW 5-52



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DUGWAY PROVING GROUND

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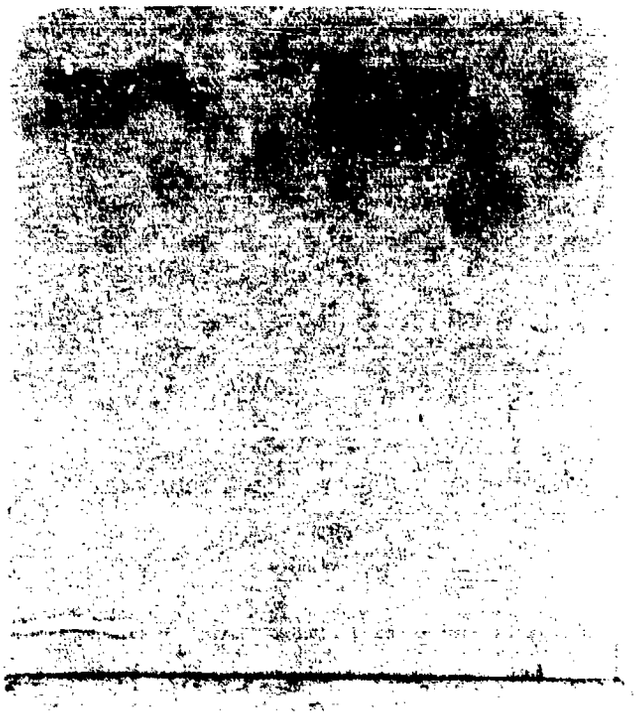

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RW DECONTAMINATION AND LAND RECLAMATION STUDIES, DPG-RW-7-52

DUGWAY PROVING GROUND REPORT 109

Project Numbers 4-98-05-005 and 4-98-05-007

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Recommending Approval:

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DPGR-109

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CONTENTS

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ABSTRACT

OBJECTIVES

The objectives of this test were: (1) To investigate the range of depths and average depth to which the pellets penetrate into the soil under conditions prevailing during hot RW sphere trials during the spring 1952; (2) To determine the feasibility of locating individual RW pellets by means of a gamma survey meter or by means of a beta probe; (3) To determine the feasibility of removing individual pellets and the time required for this operation; (4) To obtain data on the performance of the following land reclamation measures: plowing, grading and scraping, noting any atypical effects and results peculiar to RW agent; and (5) To evaluate waste collection and disposal procedures.

RESULTS indicated that ~~Six trials were conducted between 6 and 9 June 1952.~~ No evidence of pellet penetration was found; all pellets located were on the surface of the terrain or in surface cracks. Nineteen pellets were located and manually removed from an area of 10,000 square yards in 80 minutes.

Areas were decontaminated by moldboard plowing, disk harrow-

continue on page 6

from page 5

ing, grading, and scraping. Data for comparing the efficiencies of these methods were obtained.

CONCLUSIONS

For strip decontamination, the moldboard plow or a combination of the motor grader and scraper appear superior to the disk harrow.

In area decontamination, the effectiveness of the procedures used was dependent on the initial intensity at the low-intensity levels encountered in this test (0.1 to 20 mr/hr). The percentage reduction of intensity attained by each decontamination procedure increased with higher initial intensity. The extent of the dependence on initial intensity is known only at the levels encountered in this test. Hence, comparison of relative effectiveness of the different area decontamination procedures tested is inconclusive because of (a) the large variability in the data and (b) the inability to extrapolate from tracer to operational levels.

INTRODUCTION

AUTHORITY

This test was authorized by:

Test Directive, CMLRE-G, 7 April 1952, subject: RW Contamination and Land Reclamation Studies, RW 5-52.

The test was conducted under Research and Development Project 4-98-05-011: Testing of RW Materiel for Detection, Protection, and Decontamination, DPG.

OBJECTIVES

The objectives of this test were:

"To investigate the range of depths and average depth to which the pellets penetrate into the soil under conditions prevailing during hot RW sphere trials during the spring 1952.

"To determine the feasibility of locating individual RW pellets by means of a gamma survey meter or by means of a beta probe.

"To determine the feasibility of removing individual pellets and the time required for this operation.

"To obtain data on the performance of the following land reclamation measures: plowing, grading and scraping, noting any atypical effects and results peculiar to RW agent.

"To evaluate waste collection and disposal procedures."

SCOPE

The test consisted of six trials designed to determine agent-pellet penetration in the soil and to evaluate the relative effectiveness of five methods of decontaminating undeveloped land areas. The implements used for decontamination were those normally available in such areas.

Methods of decontamination were of three general classes: (1) manual removal of pellets, (2) land tillage or plowing, (3) removal of surface soil. The trials conducted and the specific techniques employed in each are listed below.

Trial 1. Contaminant Penetration and Distribution of Radiation Intensity. Depth of agent penetration was to have been determined by measurement of core samples of the soil. However, all pellets were found on the surface or in surface cracks.

Trial 2. Contaminant Distribution and Manual Removal. The pellets located were picked up with a shovel, placed in a wheelbarrow and removed from the test area.

Trial 3. Decontamination by Land Tillage. This trial was designed for the use of a rototiller but a disk harrow was used because a rototiller was not available.

Trial 4. Decontamination by Land Tillage. A moldboard plow attached to a Ford tractor was used to till the soil and bury the contaminant. The garden tractor, originally designated for this trial, was not powerful enough to turn the hardened soil.

Trial 5. Decontamination by Removal of Surface Soil. The area was motor graded, the resulting windrows forming at opposite edges of the area. The extent of decontamination was evaluated both before and following removal of the windrows from the test site.

Trial 6. Decontamination by Removal of Surface Soil. A self-powered scraper was used to remove surface soil which was subsequently taken to a disposal pit.

Efficiency of the decontamination procedures was evaluated by determination of (1) effectiveness in the reduction of radiation intensity and (2) total time and man hours required to accomplish decontamination.

MATERIALS AND METHODS

MATERIALS

Target Areas

Areas decontaminated during the test were selected from a grid contaminated during previous field trials, in which several spherical RW munitions were dropped on Targets "K" and "N", east of Granite Peak, 23 to 27 May 1952.[1] These munitions were filled with radioactive tantalum dust pellets in the shape of cylinders prepared in two sizes: 1½ mm diameter by 1½ mm in height, and 3 mm by 3 mm. The pellets were

[1] "Dynamic Test of Spherical Radiological Munitions: DPG RW 2-52," DPGR 108. 15 May 1953.

composed of 99 per cent tantalum dust and one per cent molybdenum sulfide. A section of the area contaminated by Munition 9 was chosen in which the level of radiation three feet above terrain was from one to 20 mr/hr. Within this section, six areas, each 100 feet square and at least 150 feet from any other area, were selected. One area was assigned each trial and numbered accordingly. Relative area locations are shown in Figure 1.

Area 2 (Fig. 1) was used for both trial 1 and trial 2 when monitoring revealed that the level of radiation in Area 1 was too high for the decontamination trials on the other areas.

In all areas, intensity measurements were made at intervals of 10 feet on a square grid. In Areas 1 and 2, the intervals were marked by stakes (Fig. 2). In the remaining areas, rows of stakes were placed 10 feet beyond two parallel boundaries (Fig. 3) and a 120-foot rope, with markers every 10 feet, was stretched between opposite stakes to locate points for intensity measurements (Fig 4). The grids were labelled by the letters A through K along one coordinate axis and by numbers, 1 through 11, along the other axis.

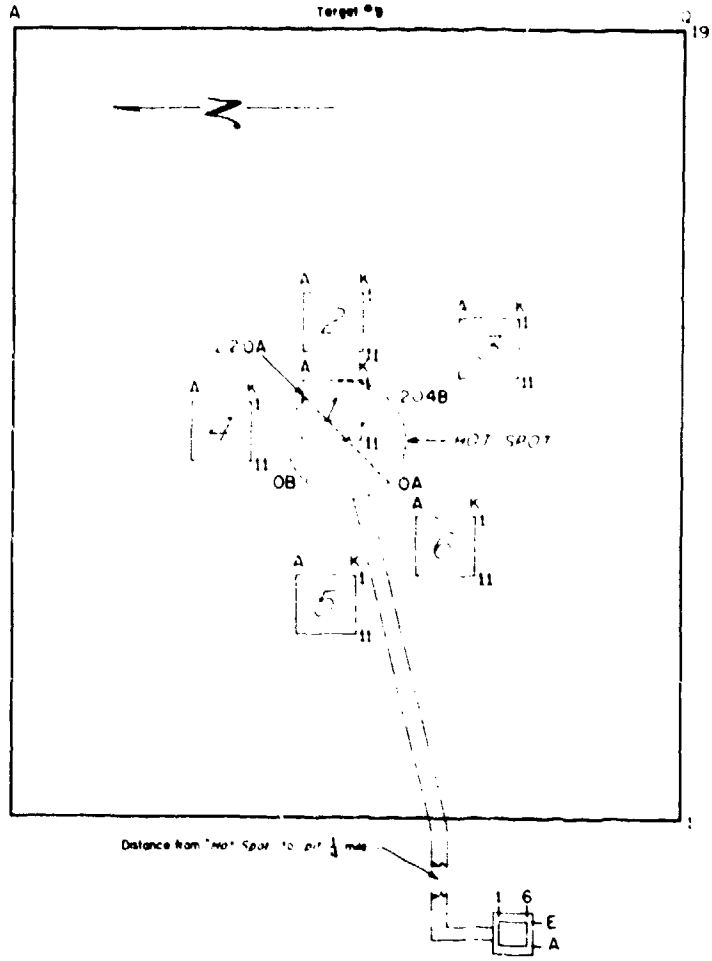

Fig. 1. - The testing areas in relation to each other, to the "Hot Spot", and to the disposal pit. The coordinates for the grid within the pit, the areas, and the "Hot Spot" are indicated. Stations in the "Hot Spot" run from 0A to 220A, and from 0B to 204B along the two perpendicular lines.

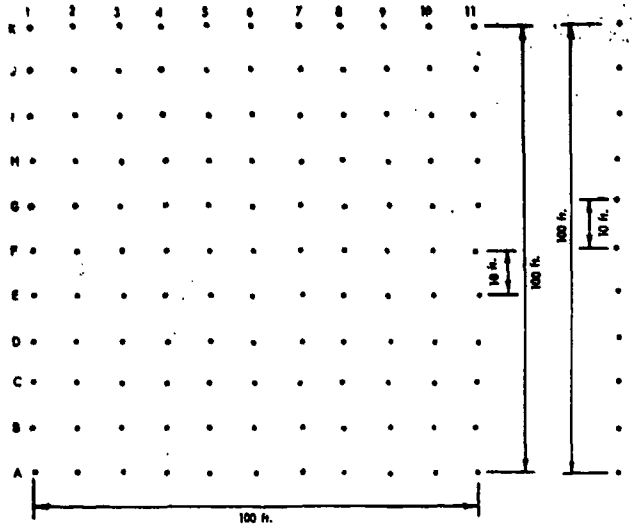

Fig. 2. – Area for Trials 1 and 2.

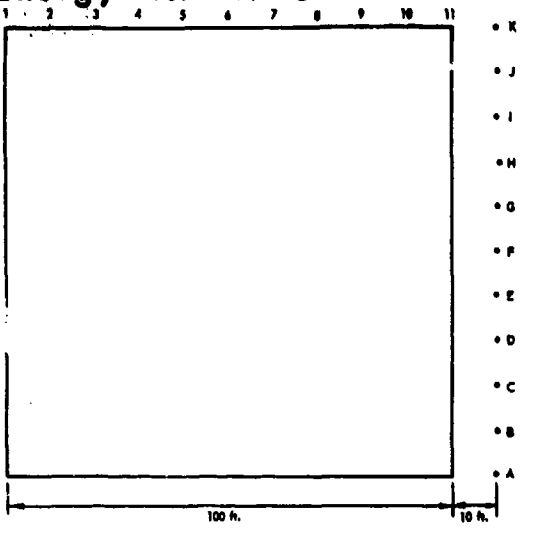

Fig. 3. – The type of area used for Trials 3 through 6.

Fig. 4. – The 120-foot rope used to locate points for monitoring in Areas 3 through 6. Personnel are seen reading and recording gamma-intensity measurements registered on the MX-5 radiation

Disposal Pit

A square pit, 70 by 70 by 3 feet, was dug approximately one-fourth mile west of the center of the contaminated area (Fig. 1). It was used for depositing the surface materials removed from a center hot spot and the pellets and soil removed in trials 2, 5, and 6.

Decontamination Equipment

Decontamination procedures required the use of the following equipment: Patrol Grader, Austin Western Model 99-H; Wooldridge "Terracobra" self-powered scraper, 14 cubic yards; Dearborn Lift-E Model disk harrow; Ford tractor with moldboard plow; wheelbarrow; and supporting vehicles.

Radiation-Intensity-Measurement Equipment

The MX-5 and T1-B radiation meters were used to measure gamma radiation intensities in all the areas surveyed. A portable GE scintillation counter with a directional probe was used to locate pellets in Trial 2.

Protective Equipment

At all times personnel wore film badges, as well as dosimeters. Protective clothing was worn when there was danger of direct contact with radioactive material.

METHODS

Radiation Intensity Measurements

In all trials, radiation intensity measurements were made in three surveys as listed below. At each station, readings were taken at ground level and at a height of three feet.

TRIAL	SURVEY		
	PRELIMINARY	INITIAL	FINAL
1	4 June	-	-
2	4 June	9 June	10 June
3	4 June	9 and 10 June	10 June
4	4 June	9 June	10 June
5	4 June	6 June	9 June
6	4 June	6 and 9 June	9 June

Decontamination procedures were conducted between initial and final surveys. The initial surveys were repeated in trials 3 and 6 to determine the extent of intensity changes caused by weathering between the surveys. Additional intensity measurements were made in all trials for the specific purposes of the trial.

A high-intensity area, 20 to 400 mr/hr, located on and around Area 1 during preliminary survey, was decontaminated by scraping an area 200 feet in diameter (within the 20 mr/hr isointensity line), because the intensity of this area was considered too high to permit conduct of decontamination trials in nearby lower intensity areas (Appendix IV). The soil removed was taken to the disposal pit. Therefore, trial 1 was conducted on Area 2.

No beta-intensity measurements could be made with the MX-5 meters used and gamma-intensity readings at ground level and at a height of three feet were considered to be sufficient for the purposes of this test.

During the test, five surveys were made of the disposal pit. Data obtained from these surveys may be found in Appendix V.

Contaminant Distribution and Manual Removal, Trials 1 and 2

In trial 1, core samples were to have been taken from the places where individual pellets were located to determine the depth to which the pellets had penetrated. Since all pellets were found on the surface or in surface cracks, such sampling was not done. Records were kept of the locations of the pellets and of the time required to locate them.

In trial 2, pellets were located by the use of the scintillation counter at or near stations J4, I1, and B9. These pellets, and those located in trial 1, were shovelled into a wheelbarrow (Fig. 5). The wheelbarrow was run up a ramp onto a truck, transported to the disposal pit, and unloaded into the pit. Each time five pellets were removed, readings were taken between the wheelbarrow handles one foot from the wheelbarrow and three feet above terrain. Other data taken included the number and location of all pellets and the times required to locate and remove them.

Fig. 5. – Manual removal of pellets in Trial 2. The man in the center is using a scintillation counter with a directional probe. The man on the right is making use of the MX-5 radiation meter.

Decontamination by Land Tillage, Trials 3 and 4

In trial 3, land tillage was accomplished with a disk harrow (Fig. 6) driven in an ever-widening pattern around a center line. Passes were made back and forth beside the line and intensity readings were taken at three and six-foot heights, at 10-foot intervals, along the line when the total width of the tilled area measured 0, 22, 44, 68 and 100 feet, respectively. The times required for each pass and for turning between passes were also recorded.

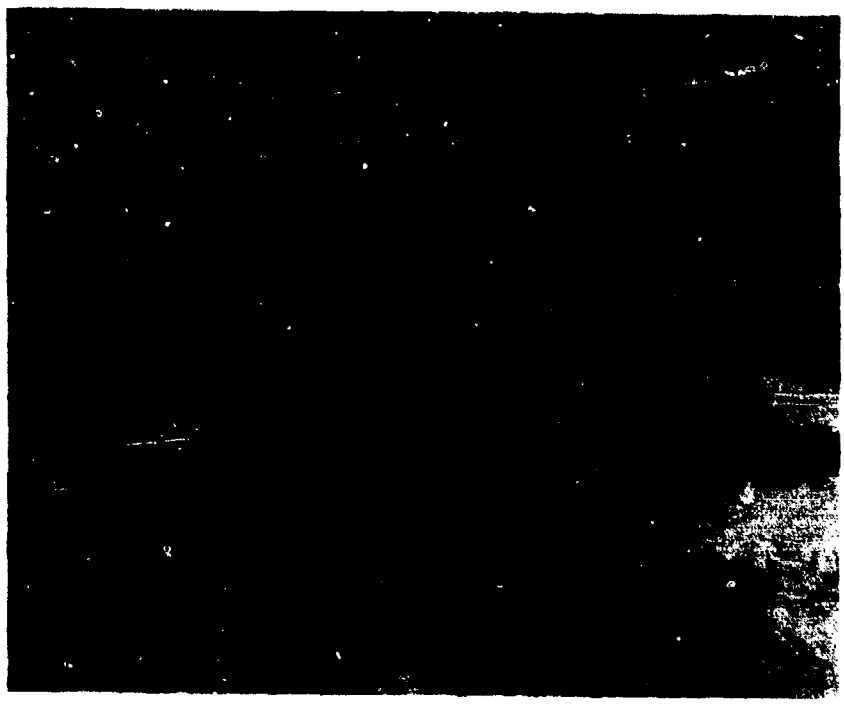

Fig. 6. – The disk harrow used in Trial 3.

In trial 4, a moldboard plow (Fig. 7) attached to a garden tractor was to have plowed a six-foot square in the center of the area, with parallel furrows five inches deep. The remainder of the area was to have been plowed with a continuous furrow starting around the periphery of the central six-foot square and working in increasingly larger squares to the boundaries of the area. Because of the hardness of the soil, however, it was necessary to substitute a Ford tractor. This tractor was much less maneuverable than the garden tractor; hence, the plowing pattern was changed from an expanding type of pattern to one resembling that in trial 3. Gamma-intensity

measurements were made along the center line when the total width of the treated area measured 0, 20, 40, 60, 80 and 100 feet, respectively.

Fig. 7. – The moldboard plow used in Trial 4.

Decontamination by Surface Removal, Trials 5 and 6

In trial 5, the area was motor graded in a series of double passes which progressively moved the resulting windrows to the opposite edges of the target (Fig. 8). Because of the number of molehills and the hardness of the terrain, the depth of the cut varied between one and six inches. On each succeeding pass, the grader moved back and forth along the boundaries of the previous

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pass. The complete trial required six double passes. The final windrows, which were surveyed when grading was completed, were removed to the pit by a self-powered scraper (Fig. 9), since the radiation from these windrows was more intense than the surrounding untreated terrain. A second-final survey was then made of Area 5.

In trial 6, a scraper was used to remove a layer of soil approximately four inches deep (Fig. 9). After each pass, the scraper made the half-mile round trip to the disposal pit where the soil was dumped.

Fig. 8. – The motor grader used in Trial 5. The standard grader blade between the front and rear wheels was used in the operation.

Fig. 9. – The self-powered scraper used to remove the surface layer of the center hot spot, the windrows in Trial 5, and the layer of soil in Trial 6.

RESULTS

Radiation-intensity readings taken in the preliminary surveys for each trial and in the initial and final surveys for trials 2 through 6 are given in Appendix I. The contours for the respective survey data obtained in each trial are presented in Appendix II. Other data for the specific procedures of the individual trials are given below.

Contaminant Distribution and Manual Removal, Trials 1 and 2

Fifteen pellets were located in trial 1 and four in trial 2. The first seven pellets were located by two men in 25 minutes and the next eight by three men in 27 minutes, using MX-5 and T1-B meters. The four pellets located in trial 2 were found in 27 minutes by a two-man team using the scintillation counter. The 15 pellets located in trial 1 were removed in three wheelbarrow loads, the remaining four in one load (Table 1). Locations of the pellets and the positions of the wheelbarrow when gamma-radiation measurements were made are indicated in Figure 10.

TABLE 1: Manual Pellet Removal, Trial 2

OPERATION	NUMBER OF PELLETS REMOVED	TIME TO COMPLETE OPERATION (minutes)	INTENSITY AT WHEELBARROW HANDLES (mr/hr)	LOCATION OF WHEELBARROW (station)
1	5	11	13	F10
2	5	5	20	D7
3	5	5	28	G4
4	4	?	48	F2

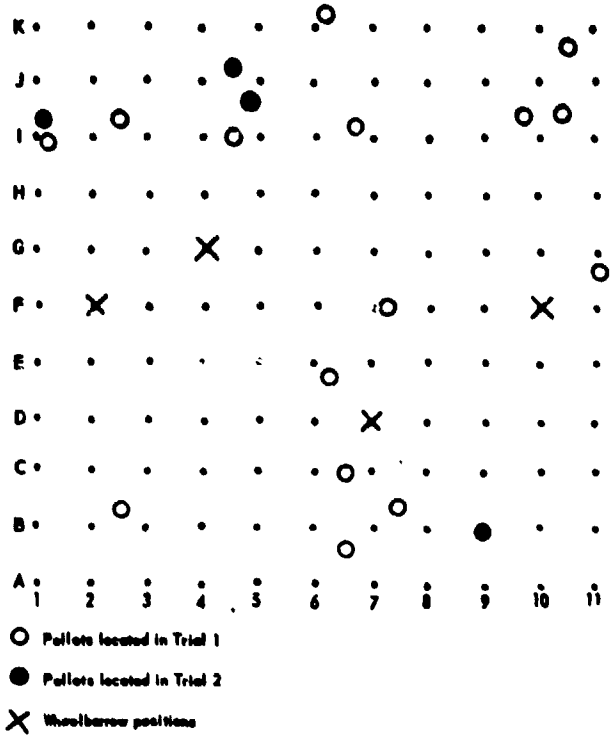


Fig. 10. – Locations of pellets found in Trials 1 and 2 and the positions of wheelbarrow during pellet removal.

Decontamination by Land Tillage, Trials 3 and 4

The time required in trial 3 to decontaminate the area with the disk harrow and the number of passes needed to add each increment of width are given in Table 2.

TABLE 2: Decontamination by the Disk Harrow, Trial 3

OPERATION	WIDTH OF TILLED AREA (feet)	CHANGE IN WIDTH (feet)	NUMBER OF PASSES REQUIRED	TIME REQUIRED (seconds)
1	22	22	4	149
2	44	22	4	125
3	68	24	4	92
4	100	32	6	204

The radiation intensities measured along the center line before disk harrowing and following each operation listed in Table 2 are given in Table 3.

TABLE 3: Radiation Intensities Along Center Line, Trial 3

STATION	GAMMA RADIATION INTENSITIES WIDTH OF TREATED AREA									
	3-foot Level					6-foot Level				
	0 ft.	22 ft.	44 ft.	68 ft.	100 ft.	0 ft.	22 ft.	44 ft.	68 ft.	100 ft.
A6	1.8	1.5	1.4	1.4	1.2	2	2	2	2	2
B6	3	2.1	2	2	2	4	3	3	3	3
C6	7	6	6	6	6	6	5	5	5	5
D6	6	5	4	4	4	6	5	6	5	5
E6	4	3	3	2	2	4	4	4	4	3
F6	2	1.9	1.5	1.6	1.5	3	2	2	2	2
G6	2	2.1	2	1.3	1.3	3	2	2	2	2
H6	3	2	2	2.1	1.2	4	3	3	3	3
I6	2	1.5	1.3	1.3	1.2	4	4	4	4	4
J6	1.8	1.2	1.0	1.4	0.9	2	2	2	2	2
K6	1.1	0.9	0.9	0.9	0.9	2	1.6	1.4	1.4	1.5

In trial 4, the time required for each pass of the moldboard plow and for the turns between passes was not recorded except in a few instances (Table 4).

TABLE 4: Representative Time Requirements per Pass and Turn of the Moldboard Plow, Trial 4

SAMPLE PASS NUMBER	TIME (seconds)	SAMPLE TURN NUMBER	TIME (seconds)
1	35	1	20
2	34	2	13
3	31	3	11
4	36	4	15
5	33	5	18
6	38	6	13
7	32		
8	34		

The number of passes required to plow each 20-foot width are listed in Table 5.

TABLE 5: Passes Required to Plow 20-Foot Widths with the Moldboard Plow, Trial 4

OPERATION	WIDTH OF CLEARED AREA (feet)	CHANGE IN WIDTH (feet)	NUMBER OF PASSES
1	20	20	14
2	40	20	16
3	60	20	20
4	80	20	16
5	100	20	22

The radiation intensity measurements made along the center line before plowing and after each operation listed in Table 5 are given in Table 6.

TABLE 6: Radiation Intensities Along Center Line, Trial 4

STATION	GAMMA RADIATION INTENSITIES WIDTH OF PLOWED AREA											
	3-foot Level						6-foot Level					
	0 ft	20 ft	40 ft	60 ft	80 ft	100 ft.	0 ft.	20 ft.	40 ft	60 ft.	80 ft	100 ft.
A6	1.5	0.9	0.9	0.8	0.5	0.7	1.7	1.8	1.4	1.2	0.8	0.8
B6	1.2	0.8	0.8	0.7	0.5	0.4	1.8	1.5	1.3	1.0	0.9	0.7
C6	1.0	0.9	0.8	0.5	0.4	0.4	1.8	1.4	1.3	1.0	0.7	0.8
D6	1.0	0.8	0.8	0.5	0.4	0.4	1.7	1.3	1.4	1.2	0.9	0.8
E6	1.0	1.0	0.9	0.7	0.5	0.5	1.5	1.4	1.4	1.3	0.8	0.8
F6	1.2	1.2	0.9	0.8	0.5	0.5	1.7	1.5	1.5	1.3	0.9	0.9
G6	2.0	1.8	1.4	1.0	0.9	1.0	2.4	2.0	1.5	1.4	1.0	1.2
H6	2	1.8	1.2	0.9	0.8	0.9	2	1.4	1.8	1.5	1.3	1.0
I6	5	2.0	1.9	1.2	1.2	1.0	3	2.4	2	1.5	1.7	1.7
J6	9	2	2	1.9	1.8	1.8	6	3	3	3	2	2
K6	7	2	1	1	1	1	7	5	3	3	3	3

Decontamination by Surface Removal, Trials 5 and 6

Table 7 lists the time required for each pass and turn of the grader in Trial 5.

TABLE 7: Decontamination by Motor Grader, Trial 5

OPERATION	NUMBER OF PASSES	GRADING TIME (seconds)	TURNING TIME (seconds)
1	1	45	55
2	1	63	53
3	1	161	109
4	1	55	60
5	1	118	117
6	1	52	40
7	1	55	60
8	1	57	-
9	1	53	28
10	1	50	42
11	1	46	69
12	1	54	-

Radiation intensities measured along the center line before and after each two of the operations listed in Table 7 are given in Table 8.

TABLE 8: Radiation Intensities Along Center Line, Trial 5

STATION	GAMMA RADIATION INTENSITIES DOUBLE PASS*												
	3-foot Level							6-foot Level					
	0	1	2	3	4	5	6	1	2	3	4	5	6
A6	3	10	5	5	6	6	10	5	2	2	1.5	1.4	1.6
B6	1.5	3	1.4	3	3	3	3	3	1.7	3	2	3	3
C6	1.0	0.9	1.1	1.3	0.9	1.1	1.0	1.6	1.6	1.4	1.6	1.6	1.5
D6	0.9	0.8	0.8	0.9	0.9	0.9	0.7	1.6	1.6	1.4	1.3	1.3	1.1
E6	1.4	1.1	1.1	1.0	1.0	0.9	0.8	1.5	1.7	1.6	1.4	1.4	1.1
F6	1.8	1.3	1.3	0.9	0.9	1.0	0.7	1.4	1.9	1.7	1.4	1.6	1.3
G6	1.2	1.4	1.4	1.4	1.3	1.1	1.0	1.6	1.9	1.9	1.6	1.7	1.6
H6	2.0	1.4	1.7	1.6	1.5	1.3	0.9	1.5	2.1	1.7	1.8	1.7	1.1
I6	1.1	1.0	1.3	1.7	0.9	1.3	1.1	1.5	1.9	1.8	1.5	1.8	1.6
J6	2	1.1	1.1	0.8	0.9	0.9	0.8	1.5	1.8	1.9	1.3	1.4	1.1
K6	1.1	1.0	0.9	0.8	0.9	0.8	0.8	1.5	1.5	1.4	1.3	1.6	1.0

*16 2/3 feet average width of a double pass

No intensity measurements were made along the center line of the area decontaminated by the scraper in trial 6. The time requirements of the scraping operation are shown in Table 9.

TABLE 9: Decontamination by the Self-powered Scraper, Trial 6

OPERATION	NUMBER OF PASSES	SCRAPING TIME (seconds)	PIT TRIP TIME (seconds)
1	1	36	150
2	1	34	143
3	1	38	182
4	1	39	159
5	1	38	180
6	1	51	145

Continued

TABLE 9: Decontamination by the Self-powered Scraper, Trial 6 (Continued)

OPERATION	NUMBER OF PASSES	SCRAPING TIME (seconds)	PIT TRIP TIME (seconds)
7	1	44	143
8	1	30	140
9	1	84	147
10	1	47	125
11	1	ND	ND
12	1	42	141
13	1	43	141
14	1	34	138
15	1	41	120
16	1	50	140
17	1	51	-

DISCUSSION

Time Requirements for Decontamination Procedures

Comparison of the time requirements for the various decontamination procedures is given in Table 10. The time requirements may not be representative of actual operating conditions because unskilled operators were employed. The time required for manual removal of the contaminant was dependent upon the manpower available and is approximately inversely proportional to the number of men employed in this procedure. Also, this decontamination procedure is applicable only in the event that the contaminating agent is in some discrete form, such as the pellets used in this test.

TABLE 10: Comparison of Time Requirements for Decontamination Procedures

DECONTAMINATION METHOD	AVERAGE WIDTH PER PASS (feet)	AVERAGE TIME PER PASS (seconds)	AVERAGE TIME PER 100 SQUARE FEET (seconds)
Manual Removal	-	-	48.0*
Disk Harrow	5.56	31.7	5.7
Moldboard Plow	1.14	34.1	29.9
Motor Grader	8.33	67.4	8.1
Scraper	5.88	43.9	7.5

*The use of a scintillation counter throughout the trial probably would have reduced this value considerably.

Effectiveness of Strip Decontamination

Strip decontamination is defined in this report as the process of decontaminating a narrow strip of land through a contaminated area. In this test the width of the strip was progressivley increased and the effectiveness of the procedures employed was measured by determination of the reduction in the level of intensity along the center line.

The average radiation-intensity readings shown in Tables 3, 6, and 8 are plotted against the width of the decontaminated area in Figures 11, 12 and 13. Evaluation of the motor-grading procedure is difficult because of the low intensities originally measured at the six-foot height and because no readings were made at the three-foot height before the grading was begun. However, if this procedure is evaluated on the basis of data taken following removal of the windrows from the test site, it is almost as effective as decontamination by moldboard plowing. Decontamination by disk harrowing is the least

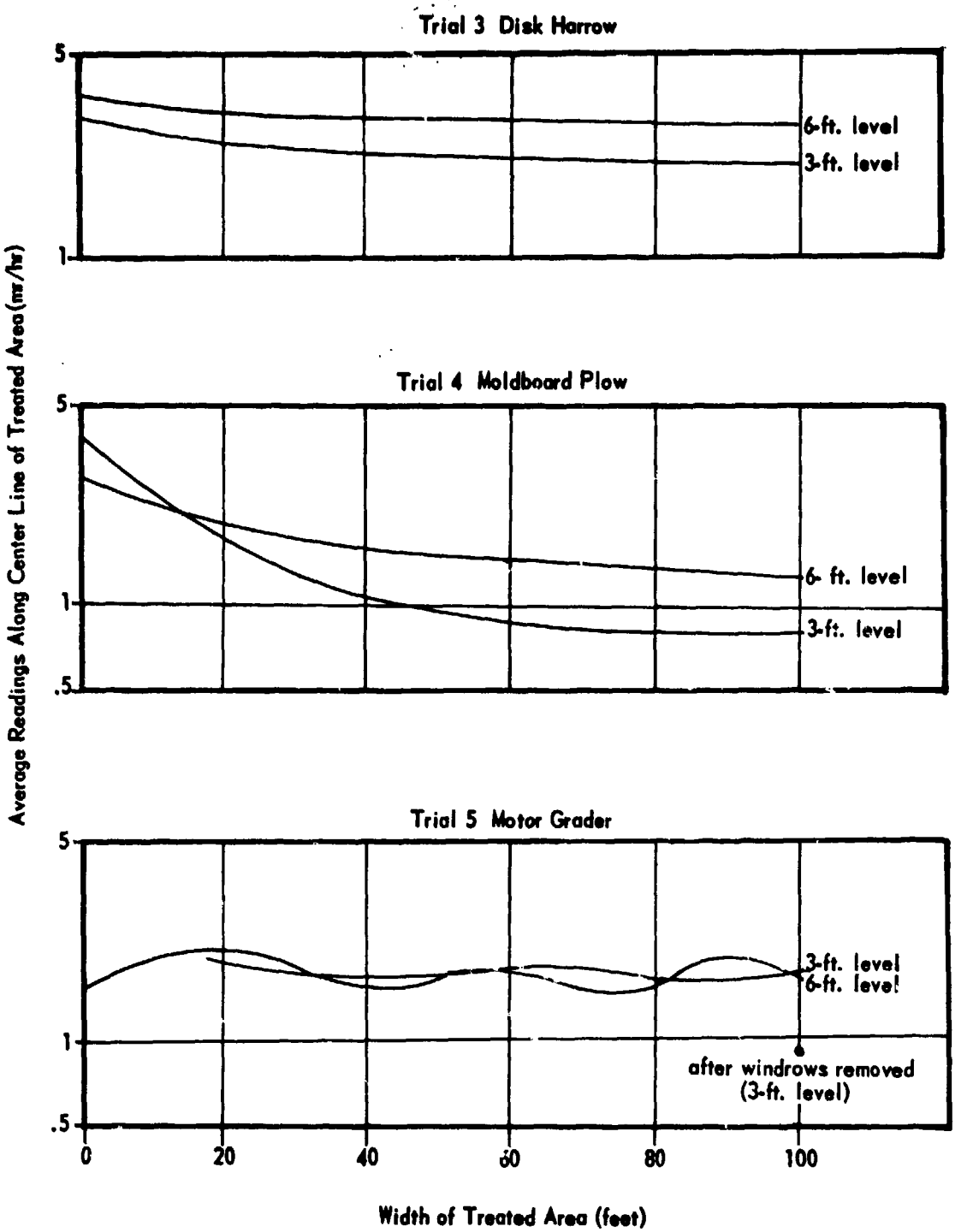
effective of the three methods compared.

Intersection of the curves drawn for the three and six-foot height measurements in Figure 12 indicates a local contamination near the center line which was evidently removed by the grader in the first two passes.

Effectiveness of Area Decontamination

The two methods used for evaluation of the effectiveness of decontamination procedures were (1) determination of ratio of areas inclosed by isointensity lines before and after decontamination and (2) determination of the functional dependence of the decontamination coefficient on the initial intensity.

The areas inclosed by isointensity lines (Appendix II) before and after decontamination, and the ratios of these areas are given in Table 11. The information which may be obtained from the ratios shown in the last column of Table 11 is inconclusive because some ratios equal to zero were obtained. A reduction in area at a given intensity level to a zero value following decontamination may mean a reduction in area of from one to 173 yards.



Figs. 11, 12, and 13. – Center-line intensity versus width of decontaminated area.

TABLE 11: Effectiveness of Decontamination Procedures Evaluated by Comparison of Areas Included by Isointensity Lines Before and After Decontamination

DECONTAMINATION METHOD	ISOINTENSITY LEVEL (mr/hr)	AREA ENCLOSED (Square Yards)* BEFORE DECONTAMINATION	AREA ENCLOSED (Square Yards)* AFTER DECONTAMINATION	RATIO OF FINAL TO INITIAL AREA
Manual Removal Trial 2	20	1	0	0
	10	9	0	0
	5	148	2	0.014
	1	955	240	0.251
	0.5	1111	993	0.894
Disk Harrow Trial 3	20	0	1	-
	10	3	5	1.67
	5	194	175	0.902
	1	1055	832	0.789
	0.5	1111	1110	0.999
Moldboard Plow Trial 4	20	0	0	-
	10	49	0	0
	5	173	0	0
	1	983	379	0.386
	0.5	1111	1089	0.980
Motor Grader Trial 5	20	0	0	-
	10	2	8	4.00
	5	88	24	0.273
	1	978	435	0.445
	0.5	1111	1072	0.965
Scraper Trial 6	20	0	0	-
	10	2	0	0
	5	42	9	0.214
	1	882	114	0.128
	0.5	1111	534	0.481

* The values in these columns were obtained by planimetry of the contours of the three-foot height measurements (Appendix II).

The decontamination coefficient, defined by

$$D = \frac{F}{I}$$

where I and F are intensity measurements taken at each station in the area before and after decontamination, was examined as a function of the initial intensity, I, for all the procedures tested. Scatter diagrams of D versus I were made (Appendix III). At the low intensities involved in this test, these diagrams indicated a functional relation between D and I in all trials except trial 3 (disk harrow) at the three-foot level. Regression lines were derived for the different trials and were plotted on a log log scale for all trials except trial 3 at the three-foot level. These graphs show a linear relation on the log log scale between D and I for the range of intensities of this test. The method of calculation used does not allow extrapolation to higher intensities.

Comparison of the regression lines shows that the comparative effectiveness of the decontamination procedures (as evaluated by the decontamination coefficient, D), changes with the initial intensity, and that the procedures can be compared only for a designated intensity. Although significance tests performed on the slopes of the lines indicate significant differences, with a probability greater than .95, for all trials and levels except the ground levels of tr[redacted] and 6 and the three-foot levels of

trials 2 and 5, the 90 per cent confidence interval for any one regression line includes the regression lines of the other trials. Therefore, on the basis of the evaluation for this one test, it cannot be stated with confidence that any one area decontamination procedure is more effective than any other in reducing radiation intensity.

CONCLUSIONS

For strip decontamination, the moldboard plow or a combination of the motor grader and scraper appear superior to the disk harrow.

In area decontamination, the effectiveness of the procedures used was dependent on the initial intensity at the low-intensity levels encountered in this test (0.1 to 20 mr/hr). The percentage reduction of intensity attained by each decontamination procedure increased with higher initial intensity. The extent of the dependence on initial intensity is known only at the levels encountered in this test. Hence, comparison of relative effectiveness of the different area decontamination procedures tested is inconclusive because of (a) the large variability in the data and (b) the inability to extrapolate from tracer to operational levels.

APPENDIX I

GAMMA-INTENSITY MEASUREMENTS:
SURVEY READINGS FOR TRIALS 1 THROUGH 6

RESTRICTED DATA Atomic Energy Act - 1946

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Preliminary Survey, Trial No. 1
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	80	80	90	90	100	90	110	240	260	110	100
J	60	60	60	80	100	100	80	100	100	100	160
I	80	80	100	80	90	100	110	120	120	100	180
H	60	1800	60	65	80	140	140	120	160	380	260
G	70	1100	80	70	130	140	150	130	220	410	290
F	13	18	100	60	120	130	325	520	410	1000	1000
E	11	12	22	27	80	190	360	490	1000	420	1100
D	15	21	10	50	100	100	190	500	330	490	390
C	40	16	11	22	80	140	230	390	320	370	440
B	10	13	14	20	30	95	140	160	420	320	540
A	14	14	22	15	33	95	95	180	210	280	350

INTENSITY (mr/hr) Three-foot Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	80	80	90	100	110	120	140	170	180	160	150
J	80	80	100	100	120	120	120	140	140	160	160
I	90	90	110	110	110	130	140	150	170	190	180
H	80	600	80	80	100	140	140	160	180	240	210
G	80	600	90	90	110	130	170	180	240	320	285
F	29	36	80	80	95	125	210	280	300	380	400
E	26	32	46	90	115	160	250	340	340	360	420
D	25	22	22	40	80	110	260	290	290	300	340
C	26	23	22	38	100	130	230	270	295	300	360
B	22	27	32	46	70	110	155	210	290	320	320
A	22	28	36	36	90	105	140	170	220	230	240

Preliminary Survey, Trial No. 2
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	0.4	0.5	0.9	1.1	3.0	Hot*	1.4	1.0	1.3	4.0	6.0
J	0.6	0.7	0.7	2.0	5.0	1.2	5.0	0.7	1.1	5.0	2.0
I	4.0	6.0	3.0	1.5	5.0	3.0	7.0	3.0	4.0	5.0	Hot
H	1.6	1.2	1.2	1.3	1.1	1.4	1.4	1.6	1.3	3.0	3.0
G	0.6	0.6	0.6	0.6	0.7	0.8	0.7	1.0	1.0	1.2	11.0
F	0.7	0.5	0.6	0.8	0.9	1.7	16.0	1.1	0.9	1.0	1.1
E	1.0	0.6	0.8	0.5	0.9	Hot	3.0	0.9	0.7	0.7	0.8
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
C	0.8	2.0	3.0	1.2	0.7	1.3	1.2	1.0	0.9	0.7	1.0
B	1.0	1.1	11.0	1.1	1.0	1.2	2.0	1.1	1.2	1.0	1.0
A	1.4	1.5	1.1	1.0	1.0	1.0	0.9	0.7	1.1	1.1	2.0

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	1.1	1.1	1.5	2.0	6.0	10.0	4.0	4.0	3.0	5.0	11.0
J	2.0	2.0	3.0	5.0	6.0	3.0	3.0	3.0	3.0	7.0	6.0
I	4.0	10.0	5.0	5.0	9.0	5.0	9.0	6.0	5.0	8.0	1.5
H	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	6.0	4.0
G	1.5	1.0	1.1	1.0	1.2	1.5	2.0	2.0	1.0	3.0	9.0
F	1.4	1.4	1.4	1.9	2.0	3.0	11.0	3.0	3.0	4.0	5.0
E	1.2	0.9	1.1	2.0	2.0	4.0	5.0	3.0	2.0	2.0	3.0
D	1.0	1.0	1.0	1.0	2.0	2.0	2.0	1.0	1.0	1.0	3.0
C	1.8	3.0	4.0	2.0	1.6	3.0	3.0	3.0	3.0	3.0	3.0
B	1.4	1.6	8.0	2.0	2.0	3.0	4.0	12.0	3.0	3.0	4.0
A	2.0	1.0	1.0	1.4	1.0	2.0	2.0	1.0	0.3	3.0	2.0

* "Hot" is an off-scale reading on the MX-5 radiation meter.

[redacted]

Initial Survey, Trial No. 2
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.1	0.2	0.4	0.6	3.0	Hot	4.0	0.5	0.4	4.0	7.0
J	0.4	0.4	0.5	1.3	6.0	0.8	1.4	0.4	1.0	6.0	1.0
I	Hot	2.0	1.0	0.7	3.0	0.7	3.0	0.3	0.4	0.7	0.9
H	0.2	0.2	0.2	0.5	0.4	0.4	0.4	0.4	0.4	0.7	1.1
G	0.2	0.3	0.3	0.3	0.4	0.5	0.4	0.6	0.4	0.4	8.0
F	0.1	0.1	0.1	0.2	0.2	0.2	Hot	0.4	0.2	0.2	0.2
E	0.5	0.4	0.5	0.4	0.6	17.0	0.7	0.3	0.4	0.4	0.4
D	0.3	0.3	0.3	0.3	0.3	4.0	0.2	0.3	0.4	0.3	0.3
C	0.6	2.0	3.0	1.1	0.4	0.9	0.7	0.8	0.6	0.4	0.4
B	0.7	2.1	4.0	0.9	0.3	0.7	1.9	0.3	0.4	0.2	0.4
A	1.1	0.9	0.5	0.6	0.4	0.5	0.5	0.4	0.5	0.4	0.9

INTENSITY (mr/hr) Three-foot Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	1.2	1.1	1.7	4.0	6.0	18.0	3.0	3.0	3.0	9.0	14.0
J	1.9	2.2	2.0	5.0	7.0	5.0	6.0	2.0	4.0	11.0	6.0
I	Hot	8.0	5.0	6.0	9.0	5.0	10.0	2.0	1.9	9.0	5.0
H	3.0	1.9	1.6	1.8	1.6	1.5	1.7	1.7	1.7	2.0	3.0
G	1.0	0.9	0.8	0.8	1.1	1.1	1.7	1.1	1.0	3.0	11.0
F	0.7	0.6	0.6	0.8	0.9	1.3	10.0	1.7	1.1	0.9	1.0
E	0.9	1.0	0.6	1.1	1.5	7.0	3.0	1.0	1.2	1.2	1.5
D	0.7	1.1	1.0	1.5	2.1	2.0	1.2	1.0	1.1	0.8	1.1
C	1.1	3.0	4.0	1.4	0.9	2.1	2.0	1.6	1.7	1.1	1.6
B	1.4	3.0	4.0	1.1	1.0	3.0	4.0	1.5	1.4	1.8	1.2
A	12.0	1.6	1.1	1.0	1.0	1.7	1.7	1.1	1.3	2.0	0.4

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Final Survey, Trial No. 2
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	6.0	2.0	0.7	0.4	0.8	0.4	0.4	0.3	0.3	0.2	0.2
J	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.3	0.3	0.7	0.7
I	0.4	0.4	0.4	0.5	0.6	0.5	0.5	0.5	0.6	0.7	0.7
H	0.3	0.3	0.2	0.3	0.2	0.3	0.4	0.3	0.4	0.3	0.4
G	0.3	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.4	0.3	0.3
F	0.3	0.2	0.3	0.2	0.3	0.3	0.4	0.4	0.3	0.3	0.4
E	0.4	0.4	0.2	0.2	0.2	0.7	1.0	0.4	0.5	0.2	0.5
D	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
C	0.2	0.2	0.2	0.2	0.1	0.4	0.2	0.2	0.2	0.2	0.3
B	0.3	0.5	0.3	0.3	0.4	0.5	0.5	0.3	0.3	0.3	0.5
A	1.1	0.8	0.4	0.8	0.7	0.8	0.7	0.5	0.6	0.8	3.0

INTENSITY (mr/hr) Three-foot Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	8.0	3.0	1.9	2.0	2.2	2.0	1.3	0.9	0.8	0.7	0.5
J	0.5	0.6	0.7	0.8	1.0	1.3	1.1	1.3	1.4	1.6	2.0
I	0.5	0.4	0.5	0.6	0.8	0.7	1.0	0.8	1.9	1.0	1.2
H	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.8	1.0	1.0	1.1
G	0.7	0.5	0.4	0.5	0.7	0.5	0.8	0.8	0.9	0.9	1.0
F	0.6	0.7	0.5	0.5	0.6	0.8	0.8	0.8	0.8	0.9	1.4
E	0.5	0.4	0.5	0.5	0.7	0.8	1.1	0.7	0.8	0.8	1.0
D	0.8	0.5	0.5	0.6	0.4	0.7	0.7	0.6	0.6	0.7	2.0
C	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.8	0.9	1.3
B	0.7	0.8	0.6	0.8	0.9	1.3	1.1	0.8	1.1	1.4	1.4
A	0.5	1.0	0.6	0.9	0.8	1.0	1.0	0.7	2.0	19.0	4.0

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Preliminary Survey, Trial No. 3
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	0.4	0.5	0.4	5.0	0.5	0.4	0.6	1.1	0.6	1.9	0.6
J	0.3	0.4	0.6	0.5	0.4	0.9	0.8	0.5	2.0	2.0	8.0
I	0.7	0.3	0.5	0.4	0.4	0.5	Hot	2.0	0.7	13.0	1.6
H	1.1	2.0	4.0	2.0	1.6	0.5	0.4	0.5	0.7	0.7	0.3
G	0.2	0.7	6.0	12.0	3.0	0.6	0.7	0.6	0.4	0.5	0.4
F	0.5	0.4	0.6	3.0	2.0	0.9	1.0	1.1	3.0	1.0	0.8
E	0.3	0.4	0.3	0.5	0.4	1.5	1.1	4.0	7.0	2.0	1.1
D	0.3	0.3	0.7	1.1	10.0	2.0	4.0	3.0	1.5	2.0	4.0
C	0.8	0.7	0.9	1.1	3.0	5.0	9.0	3.0	1.2	2.0	5.0
B	0.9	1.1	3.0	2.0	1.2	1.0	1.4	0.9	0.9	1.0	3.0
A	1.0	2.0	18.0	2.0	1.0	0.7	0.8	0.7	0.7	0.8	0.4

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	1.1	1.0	1.1	3.0	1.7	1.1	1.9	2.0	1.9	2.0	4.0
J	1.1	2.0	1.7	1.5	1.6	1.8	3.0	3.0	3.0	4.0	8.0
I	4.0	2.1	1.8	1.4	1.6	4.0	Hot	3.0	4.0	12.0	6.0
H	5.0	6.0	7.0	4.0	3.0	2.0	3.0	3.0	2.0	2.0	3.0
G	2.0	3.0	6.0	12.0	5.0	2.0	2.0	2.0	2.0	2.0	2.0
F	1.0	1.3	3.0	4.0	3.0	3.0	3.0	6.0	7.0	3.0	2.0
E	1.0	1.5	1.6	3.0	4.0	3.0	3.0	6.0	9.0	3.0	3.0
D	1.1	1.2	1.9	3.0	16.0	7.0	8.0	6.0	5.0	7.0	12.0
C	1.2	1.0	1.7	2.0	4.0	7.0	11.0	5.0	3.0	5.0	6.0
B	3.0	3.0	5.0	3.0	3.0	3.0	3.0	3.0	4.0	4.0	3.0
A	3.0	4.0	12.0	3.0	2.1	2.1	2.0	1.5	2.0	2.1	2.0

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First Initial Survey, Trial No. 3
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.2	0.3	0.3	6.0	0.4	0.3	0.4	0.7	0.8	2.0	0.4
J	0.2	0.3	0.7	0.4	0.3	0.8	0.9	0.3	1.7	3.0	8.0
I	0.4	0.2	0.8	0.2	0.1	0.5	7.0	0.1	0.4	4.0	3.0
H	6.0	1.1	5.0	2.0	1.6	0.4	1.1	0.5	0.5	1.1	0.9
G	0.1	0.2	1.0	Hot	1.0	0.6	0.2	0.2	0.5	0.4	0.2
F	0.1	0.2	0.5	2.0	2.0	0.6	0.7	4.0	1.0	0.6	0.2
E	0.3	0.2	0.3	0.7	1.0	0.8	1.5	3.0	1.0	0.8	0.4
D	0.3	0.2	0.3	0.7	9.0	9.0	10.0	0.9	0.4	1.0	1.4
C	0.2	0.3	0.3	0.3	0.9	4.0	6.0	0.4	0.2	1.0	20.0
B	0.3	0.5	1.3	1.2	0.7	0.7	0.8	0.4	0.5	0.5	1.0
A	0.4	1.5	15.0	2.0	0.9	0.4	0.4	0.2	0.3	0.3	0.3

INTENSITY (mr/hr) Three-foot Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.6	0.8	1.0	2.0	1.3	1.1	1.7	1.4	1.3	3.0	4.0
J	1.1	1.1	1.9	1.4	1.4	1.5	2.0	1.9	3.0	4.0	10.0
I	2.0	2.2	2.0	1.3	1.1	3.0	7.0	1.5	5.0	9.0	7.0
H	8.0	4.0	3.0	2.0	2.0	3.0	4.0	2.0	3.0	3.0	3.0
C	1.4	1.8	5.0	7.0	3.0	1.8	1.8	1.8	2.0	1.5	1.5
F	1.0	1.5	2.0	4.0	3.0	3.0	3.0	8.0	4.0	2.0	1.8
E	0.9	1.2	1.7	2.3	2.0	2.0	2.0	6.0	3.0	3.0	1.9
D	1.0	1.2	1.5	2.0	8.0	8.0	10.0	4.0	3.0	6.0	7.0
C	1.0	1.5	2.0	1.9	3.0	2.0	9.0	4.0	3.0	9.0	4.0
B	0.9	1.7	3.0	2.2	1.7	1.5	2.2	1.8	1.9	2.0	3.0
A	2.0	4.0	10.0	3.0	2.1	1.4	1.3	1.5	1.8	1.5	2.1

Second Initial Survey, Trial No. 3
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr)											
Ground Level											
	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.0	0.5	0.1	0.5	0.1	0.1	0.2	0.4	0.5	0.5	0.1
J	0.2	0.3	0.7	0.5	0.3	0.4	0.3	0.2	0.9	1.5	7.0
I	0.4	0.7	0.7	0.1	0.2	0.7	15.0	0.4	0.1	5.0	2.0
H	1.6	1.6	1.0	1.3	2.1	0.4	0.3	0.3	0.2	1.6	0.4
G	0.1	0.1	3.0	13.0	3.0	0.6	0.2	0.4	0.2	0.2	0.2
F	0.2	0.3	0.4	3.0	1.6	0.7	1.0	1.3	1.9	0.8	0.4
E	0.0	0.2	0.1	0.2	0.6	1.2	0.8	0.6	4.0	0.8	0.2
D	0.1	0.1	0.2	0.4	2.0	2.0	3.0	1.2	3.0	6.0	4.0
C	0.3	0.4	0.2	0.4	0.8	1.5	4.0	1.0	0.4	0.6	0.3
B	0.4	0.6	0.8	0.8	0.6	0.6	0.6	0.3	0.4	0.4	0.8
A	0.2	1.6	8.0	3.0	0.8	0.2	0.4	0.2	0.2	0.4	0.2

INTENSITY (mr/hr)											
Three-foot Level											
	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.6	0.8	0.9	1.3	1.2	2.0	1.4	1.4	1.5	3.0	3.0
J	1.0	1.1	1.8	1.6	1.5	2.1	1.6	2.1	3.0	4.0	8.0
I	4.0	3.0	3.0	1.5	1.5	4.0	12.0	1.7	4.0	4.0	6.0
H	5.0	5.0	2.1	4.0	1.6	2.8	4.0	2.0	3.0	3.0	3.0
G	1.2	1.5	4.0	13.0	5.0	2.0	2.0	2.0	3.0	1.9	1.5
F	1.3	1.6	2.1	4.0	2.0	2.4	2.1	5.0	7.0	2.0	1.8
E	0.8	1.0	1.3	1.9	2.0	4.0	3.0	4.0	5.0	4.0	2.0
D	0.7	0.8	1.0	1.7	8.0	5.0	7.0	6.0	7.0	12.0	9.0
C	0.9	1.0	1.5	1.9	2.0	6.0	10.0	6.0	3.0	4.0	8.0
B	1.4	1.9	5.0	3.0	1.9	2.8	2.1	2.1	1.9	3.0	4.0
A	3.0	4.0	8.0	4.0	1.7	1.8	1.4	1.3	1.3	1.7	2.0

Final Survey, Trial No. 3
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	0.2	0.2	0.2	0.7	0.2	0.2	0.4	0.2	0.2	3.0	0.5
J	0.2	0.1	0.4	0.2	0.1	1.5	0.1	0.5	0.2	0.4	7.0
I	2.0	0.5	0.3	0.2	0.3	0.6	1.0	0.2	0.8	0.5	3.0
H	8.0	2.0	2.0	2.0	2.0	1.0	0.4	0.2	0.5	0.4	1.3
G	0.3	0.2	0.8	Hot	0.5	0.2	0.2	0.4	0.2	0.1	0.2
F	0.2	0.2	0.2	1.6	0.8	0.3	0.4	0.6	3.0	0.4	0.4
E	0.1	0.4	0.4	0.5	1.8	0.6	0.6	3.0	5.0	3.0	0.9
D	0.1	0.1	0.1	0.1	13.0	0.2	0.5	0.8	4.0	4.0	7.0
C	0.2	0.2	0.1	0.2	0.3	0.3	3.0	0.3	0.3	0.5	0.8
B	0.5	0.7	1.0	1.0	0.6	0.7	0.5	0.4	0.3	1.0	0.5
A	0.4	0.8	3.0	0.8	0.4	0.2	0.2	0.4	0.2	0.1	4.0

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	0.6	0.8	0.8	2.0	0.9	0.9	1.5	0.9	1.0	4.0	3.0
J	0.5	0.9	1.2	0.8	0.5	0.8	1.0	0.8	1.0	1.5	5.0
I	4.0	3.0	3.0	1.4	1.3	4.0	4.0	0.9	9.0	4.0	6.0
H	7.0	15.0	5.0	3.0	2.0	3.0	3.0	1.2	1.5	1.5	2.0
G	1.3	1.9	6.0	Hot	1.8	1.2	1.2	2.0	2.0	1.5	1.5
F	0.6	0.8	1.0	3.0	1.9	1.6	1.0	6.0	5.0	1.9	1.5
E	0.5	0.7	0.8	1.2	2.0	1.5	0.9	3.0	6.0	4.0	1.9
D	0.5	0.7	0.8	1.5	11.0	5.0	3.0	4.0	7.0	11.0	9.0
C	0.8	0.9	1.0	1.4	2.0	6.0	5.0	4.0	1.9	6.0	7.0
B	0.8	2.0	4.0	2.0	1.6	1.6	1.3	0.8	0.9	13.0	1.6
A	3.0	3.0	9.0	3.0	1.0	0.9	0.8	1.5	1.2	0.1	4.0

Preliminary Survey, Trial No. 4
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	5.0	0.9	1.8	1.0	1.1	1.7	2.0	5.0	2.0	1.5	1.1
J	1.4	2.0	7.0	19.0	Hot	7.0	12.0	1.8	1.4	1.1	1.5
I	7.0	1.1	Hot	11.0	2.0	2.0	2.0	1.1	1.4	2.0	3.0
H	0.7	1.1	1.0	1.5	2.0	1.0	1.0	1.0	2.0	2.0	2.0
G	1.1	0.9	1.4	1.2	1.4	2.0	0.9	1.0	1.0	0.9	1.5
F	0.9	0.5	0.4	0.7	0.8	0.8	0.7	0.8	2.0	0.8	2.0
E	0.4	0.8	0.4	0.4	0.5	0.5	0.7	0.7	0.8	0.7	0.8
D	0.9	0.8	0.7	0.8	0.5	0.6	0.6	0.7	0.8	0.6	0.6
C	1.8	3.0	2.0	0.7	0.4	0.4	0.5	0.8	5.0	13.0	0.8
B	1.6	12.0	15.0	10.0	1.0	0.6	0.8	2.0	2.0	3.0	0.5
A	0.4	0.5	0.5	0.4	1.4	0.5	0.8	Hot	0.4	0.4	0.4

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	4.0	3.0	5.0	5.0	5.0	7.0	7.0	7.0	4.0	3.0	3.0
J	4.0	5.0	8.0	11.0	Hot	8.0	8.0	5.0	4.0	3.0	4.0
I	3.0	5.0	19.0	16.0	11.0	5.0	4.0	3.0	5.0	5.0	6.0
H	1.8	2.0	3.0	5.0	3.0	3.0	2.0	2.0	3.0	5.0	3.0
G	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0
F	2.0	1.5	1.4	1.1	1.6	1.1	1.4	1.4	2.0	2.0	3.0
E	1.5	1.6	1.5	1.6	1.4	1.5	1.9	1.6	1.9	2.1	3.0
D	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0
C	3.0	4.0	2.0	1.9	1.4	1.4	1.5	3.0	7.0	12.0	3.0
B	3.0	14.0	9.0	2.0	1.5	1.4	2.0	3.0	5.0	4.0	1.5
A	1.8	3.0	2.0	1.5	1.8	1.8	5.0	20.0	3.0	1.8	1.3

Initial Survey, Trial No. 4
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	0.8	1.3	0.9	4.0	4.0	3.0	1.0	1.0	3.0	0.7	4.0
J	0.4	0.8	5.0	16.0	12.0	2.0	Hot	0.3	0.3	0.3	0.4
I	0.5	0.6	17.0	10.0	1.0	1.0	1.2	0.6	0.7	0.7	2.0
H	0.3	0.3	2.0	2.0	0.9	0.9	0.5	0.5	0.8	2.0	1.3
G	0.2	0.4	0.2	0.6	0.4	0.5	0.6	0.2	0.4	0.2	0.7
F	0.8	0.3	0.3	0.3	0.4	0.4	0.3	0.4	3.0	0.4	1.4
E	0.2	0.2	0.2	0.2	0.4	0.4	0.2	0.2	0.4	0.2	0.4
D	0.4	0.4	1.0	0.6	0.4	0.3	0.3	0.4	0.3	0.4	0.5
C	0.8	1.1	11.0	0.7	0.3	0.3	0.3	0.3	4.0	4.0	1.1
B	0.6	Hot	0.5	0.1	0.2	0.2	0.2	2.0	0.1	0.7	0.2
A	0.2	0.2	0.4	0.1	2.0	0.2	0.6	1.0	0.1	0.4	0.2

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	1.7	2.2	3.0	9.0	8.0	6.0	3.0	3.0	3.0	0.9	3.0
J	1.6	3.0	8.0	13.0	15.0	8.0	6.0	2.0	2.0	2.0	1.9
I	0.2	3.0	12.0	12.0	9.0	4.0	2.0	2.0	3.0	3.0	5.0
H	1.1	2.0	7.0	6.0	3.0	2.0	1.1	1.3	4.0	3.0	4.0
G	1.4	1.6	2.0	1.4	1.3	1.7	1.3	1.1	1.5	1.6	1.8
F	1.8	1.5	1.7	1.3	1.0	1.2	0.9	1.2	1.0	1.4	2.0
E	1.2	1.3	1.1	1.2	1.0	1.0	0.9	1.2	1.1	1.4	1.5
D	1.1	1.5	2.0	1.3	1.0	0.9	0.7	1.0	0.9	1.1	1.2
C	0.6	6.0	11.0	1.5	0.9	1.0	0.8	1.3	3.0	4.0	2.0
B	1.6	13.0	6.0	1.3	0.8	0.8	1.3	6.0	4.0	3.0	1.2
A	1.3	3.0	1.6	1.4	1.2	1.1	3.0	10.0	1.8	1.3	1.0

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Final Survey, Trial No. 4
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	0.3	0.7	0.4	0.4	0.4	0.4	0.4	0.3	3.0	0.3	2.0
J	0.7	0.3	0.3	0.5	0.9	0.3	0.8	0.4	0.5	0.4	0.3
I	0.3	0.3	0.3	0.5	0.4	0.4	0.3	0.3	0.3	0.4	1.0
H	0.3	0.2	0.2	0.2	0.2	0.4	0.3	0.2	0.8	0.4	0.7
G	0.5	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.4
F	0.4	0.2	0.2	0.0	0.2	0.2	0.2	0.0	0.3	0.2	0.9
E	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.7
D	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
C	0.2	0.5	0.2	0.3	0.2	0.2	0.2	0.2	0.5	0.2	0.3
B	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3
A	0.3	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	0.9	1.3	1.5	1.7	1.2	1.7	1.0	2.0	5.0	1.7	3.0
J	1.3	1.0	1.4	3.0	2.1	2.1	2.0	1.9	1.9	1.5	1.9
I	0.8	0.8	1.5	1.8	1.2	1.0	0.8	1.0	1.4	1.5	3.0
H	0.9	0.8	0.7	1.3	0.8	0.9	0.7	0.7	1.2	1.5	2.4
G	1.1	0.8	0.6	0.5	0.5	0.9	0.6	0.7	0.6	0.9	1.5
F	1.5	0.7	0.4	0.5	0.5	0.7	0.5	0.5	0.9	1.2	1.9
E	0.6	0.5	0.5	0.4	0.5	0.5	0.4	0.7	0.8	1.1	3.0
D	0.8	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.7	0.7	0.8
C	0.5	1.4	1.0	1.4	0.4	0.5	0.4	0.5	1.0	1.0	0.8
B	0.6	1.0	1.4	0.6	0.4	0.4	0.5	0.6	0.6	0.7	0.8
A	0.4	0.4	0.5	0.5	0.5	0.8	0.5	1.2	0.5	0.7	0.9

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Preliminary Survey, Trial No. 5
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr)											
Ground Level											
	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.8	0.9	3.0	6.0	0.8	0.5	0.8	1.0	0.5	0.5	0.5
J	1.7	1.2	1.2	1.0	0.8	0.7	0.5	0.4	0.5	0.9	0.7
I	Hot	2.0	1.3	0.8	0.4	1.2	0.8	0.7	0.8	2.0	2.0
H	0.9	1.2	0.7	0.9	0.5	1.2	Hot	1.2	5.0	6.0	0.8
G	1.0	1.0	0.9	1.2	0.8	1.2	1.4	1.0	1.9	1.3	0.8
F	0.7	0.5	0.7	0.4	0.7	0.8	0.7	1.2	1.5	1.9	0.8
E	0.7	0.5	0.5	0.5	0.7	0.7	1.5	3.0	3.0	1.0	13.0
D	0.7	0.5	0.7	0.7	0.4	0.5	0.5	0.8	0.7	0.5	19.0
C	0.5	0.5	0.7	0.5	0.8	0.5	0.7	0.7	0.7	0.4	1.0
B	1.0	0.8	0.8	0.7	1.0	0.5	0.7	0.3	0.4	0.5	0.4
A	1.2	1.0	0.8	1.0	1.3	5.0	1.0	0.5	0.9	0.8	0.4

INTENSITY (mr/hr)											
Three-foot Level											
	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	2.0	2.0	5.0	6.0	2.0	1.4	1.4	1.5	1.2	1.2	1.0
J	3.0	6.0	3.0	3.0	1.7	1.3	1.3	1.3	1.2	1.5	1.9
I	13.0	5.0	3.0	1.9	1.9	1.9	1.5	1.5	1.7	2.0	2.0
H	2.2	2.2	3.0	1.9	1.8	1.8	11.0	3.0	3.0	3.0	1.7
G	2.0	1.7	1.8	1.9	1.8	2.3	2.0	2.0	0.4	1.9	1.4
F	3.0	1.9	1.5	1.4	1.7	2.2	1.9	1.9	3.0	3.0	1.9
E	2.0	1.7	1.4	1.3	1.5	1.6	3.0	3.0	6.0	8.0	10.0
D	1.8	1.5	1.7	1.3	1.2	1.4	3.0	3.0	1.9	3.0	13.0
C	1.9	1.7	1.3	1.4	1.4	1.5	1.5	1.5	1.4	1.9	3.0
B	2.2	1.7	1.4	1.4	1.0	3.0	1.7	1.4	1.0	1.4	1.4
A	2.3	3.0	1.8	1.8	1.8	7.0	1.9	1.4	1.5	2.3	1.7

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Initial Survey, Trial No. 5
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	0.5	0.6	3.0	5.0	0.7	0.6	0.7	0.1	0.4	0.7	0.5
J	0.4	1.2	2.0	0.3	0.5	0.3	0.3	0.3	0.5	2.0	0.3
I	Hot	1.9	1.9	0.3	0.2	0.5	0.4	0.4	0.7	2.0	1.9
H	0.6	0.6	0.7	0.7	0.4	0.6	20.0	1.1	4.0	3.0	0.5
G	0.5	0.3	0.4	0.5	0.4	0.7	1.5	0.6	2.0	0.7	0.2
F	0.5	0.4	0.2	0.4	0.5	0.5	0.8	1.3	2.0	1.1	0.6
E	0.5	0.3	0.4	0.3	0.3	0.4	1.0	1.4	20.0	0.8	0.8
D	0.4	0.2	0.4	0.4	0.4	0.2	0.5	0.6	0.5	0.9	7.0
C	0.3	0.3	0.3	0.4	0.4	0.5	0.4	0.3	0.3	0.4	0.3
B	0.6	0.4	0.4	0.6	2.0	0.4	0.5	0.4	0.4	0.5	0.2
A	0.8	0.8	0.3	0.5	0.7	2.0	0.4	0.3	1.3	0.4	0.2

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	1.4	2.0	4.0	6.0	1.5	1.0	1.3	0.2	1.1	1.0	1.0
J	7.0	6.0	7.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.1
I	16.0	4.0	4	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0
H	2.0	2.0	1.4	2.0	1.0	1.7	10.0	2.0	7.0	3.0	17.0
G	2.1	1.5	1.2	1.1	1.3	1.3	2.0	1.0	4.0	1.0	1.1
F	1.4	1.1	1.0	0.9	0.4	1.6	1.6	2.0	3.0	3.0	2.0
E	1.3	1.0	0.8	0.9	1.2	1.2	3.0	2.0	15.0	2.0	7.0
D	1.2	1.1	1.1	1.0	0.8	0.8	4.0	3.0	3.0	5.0	10.0
C	1.0	1.0	0.8	0.8	0.9	1.0	1.5	1.4	1.5	2.3	2.0
B	1.7	1.1	1.0	1.2	2.0	2.0	1.1	1.1	1.1	1.3	1.1
A	1.9	1.8	1.0	1.0	1.7	6.0	1.2	0.9	1.7	3.0	0.8

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First Final Survey, Trial No. 5
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.4	0.3	6.0	3.0
J	1.0	0.4	0.4	0.4	0.4	0.4	0.3	0.4	1.3	8.0	0.7
I	Hot	0.3	0.1	0.1	0.3	0.1	0.3	0.4	0.3	0.3	0.5
H	0.5	0.4	0.4	0.2	0.3	0.5	17.0	1.0	0.3	0.3	0.4
G	0.3	0.2	0.3	0.1	0.2	0.3	0.8	0.2	0.2	0.1	0.3
F	0.5	0.2	0.4	0.2	0.2	0.2	0.4	0.1	0.1	0.1	0.1
E	0.5	0.5	0.5	0.4	1.3	0.4	0.7	0.3	0.3	0.2	Hot
D	0.6	0.4	0.3	0.2	0.2	0.2	0.3	0.2	0.1	0.2	4.0
C	Hot	1.4	0.6	0.4	0.6	0.6	0.4	0.4	0.2	0.4	0.2
B	1.1	0.9	0.6	0.4	0.7	1.1	0.4	0.3	0.5	0.3	0.3
A	1.3	0.8	0.5	0.1	0.2	4.0	0.1	0.2	0.1	0.2	0.1

INTENSITY (mr/hr) Three-foot Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	1.5	1.1	0.9	1.0	0.8	0.7	0.7	1.1	1.4	4.0	4.0
J	1.0	0.9	1.0	1.0	0.9	0.9	0.9	1.2	2.3	6.0	3.0
I	15.0	1.4	0.8	0.8	0.8	1.2	2.0	1.6	0.8	1.2	0.9
H	2.0	1.2	1.0	0.9	1.0	1.5	9.0	2.0	1.0	0.8	0.8
G	1.4	0.8	0.5	0.7	0.9	1.2	1.4	1.0	0.5	0.5	0.5
F	1.7	0.9	0.9	0.8	0.6	0.7	0.9	0.7	0.5	0.4	0.6
E	1.0	0.9	0.8	0.8	1.1	0.9	3.0	1.4	0.6	0.8	20.0
D	1.6	1.3	0.8	0.7	0.8	0.7	3.0	1.4	0.7	0.6	9.0
C	18.0	1.9	1.1	0.7	0.8	0.8	0.9	0.9	0.6	0.6	3.0
B	7.0	2.0	0.9	0.8	1.6	1.5	1.0	0.9	0.8	0.7	0.5
A	2.0	2.0	1.0	0.9	3.0	4.0	0.8	0.7	1.0	1.1	0.7

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Second Final Survey, Trial No. 5
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.5	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.5	0.2
J	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.7	3.0	0.2
I	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.4	0.5	0.2
H	0.2	0.2	0.2	0.2	0.2	0.2	Hot	0.4	0.1	0.1	0.1
G	0.2	0.4	0.3	0.3	0.2	0.2	0.9	0.3	0.3	0.3	0.3
F	0.4	0.4	0.2	0.2	0.2	0.2	0.4	0.1	0.1	0.1	0.2
E	0.5	0.4	0.3	0.3	0.9	0.3	0.4	0.2	0.2	0.2	Hot
D	0.6	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.6
C	12.0	0.4	0.4	0.4	0.2	0.1	0.4	0.2	0.2	0.2	0.6
B	5.0	0.3	0.2	0.3	0.4	0.5	1.0	0.2	0.3	0.2	0.2
A	0.4	0.1	0.2	0.5	0.4	0.2	0.2	0.4	0.7	0.5	0.4

INTENSITY (mr/hr) Three-foot Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	1.4	1.0	0.8	0.5	0.5	0.7	0.7	0.9	1.5	2.0	0.8
J	1.3	0.2	0.9	0.8	0.7	1.0	0.9	0.9	1.0	3.0	1.0
I	1.0	0.8	0.7	0.6	0.7	1.3	1.6	0.9	1.0	1.0	0.7
H	1.3	0.8	0.7	0.7	0.8	1.5	17.0	1.4	0.6	0.6	0.5
G	1.0	0.7	0.7	0.7	0.8	1.2	1.4	1.0	0.3	0.5	0.4
F	3.0	1.1	0.9	0.8	1.0	0.9	1.0	0.8	0.7	0.5	0.8
E	3.0	1.0	0.7	0.8	2.0	0.7	1.9	1.0	0.6	1.0	13.0
D	1.4	1.3	0.8	0.8	0.8	0.8	0.8	1.0	0.7	1.1	1.0
C	6.0	2.0	1.0	1.0	0.8	0.7	3.0	1.2	0.7	1.7	3.0
B	6.0	1.4	0.9	0.7	1.1	1.3	3.0	1.1	0.7	1.0	1.0
A	2.0	1.5	0.9	0.8	3.0	0.6	0.7	0.8	1.2	4.0	1.1

Preliminary Survey, Trial No. 6
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	3.0	0.9	0.4	0,6	0.7	0.8	0.6	0.5	0.6	0.8	0.3
J	0.7	0.5	0.3	0.7	0.4	1.0	5.0	2.0	0.3	0.4	0.4
I	0.4	0.5	0.5	0.3	0.4	0.5	3.0	0.5	0.4	0.4	0.4
H	0.4	0.7	2.0	1.1	2.0	2.0	0.8	0.7	1.1	0.5	0.5
G	0.9	0.8	5.0	0.7	1.0	6.0	1.1	1.0	10.0	1.5	0.6
F	2.0	1.2	0.5	0.7	0.5	0.7	1.0	1.3	3.0	1.0	0.5
E	Hot	3.0	0.7	0.4	0.5	0.5	0.7	1.0	3.0	0.6	0.4
D	2.0	Hot	0.7	0.7	0.5	0.4	0.5	1.5	0.9	0.4	0.4
C	1.1	2.0	0.5	0.7	0.5	0.6	0.6	0.6	0.4	0.5	0.4
B	0.9	1.0	0.7	14.0	0.9	0.4	0.4	0.8	3.0	2.0	0.4
A	1.0	0.7	0.8	0.5	0.5	0.5	0.5	0.4	0.5	Hot	0.5

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	5.0	0.8	1.2	1.1	1.5	1.2	1.0	1.2	1.6	3.0	7.0
J	1.1	1.6	1.3	1.0	1.0	2.0	5.0	4.0	1.2	1.1	1.4
I	1.1	1.2	1.0	1.1	1.2	1.6	4.0	3.0	1.1	0.9	1.0
H	1.6	2.0	3.0	3.0	3.0	4.0	1.9	1.3	1.6	1.5	1.1
G	1.4	2.0	7.0	3.0	2.0	6.0	2.0	2.0	3.0	2.0	1.1
F	3.0	3.0	3.0	2.0	1.2	1.4	1.3	2.0	2.0	2.0	1.1
E	Hot	5.0	2.0	1.3	1.3	1.3	1.5	15.0	5.0	1.3	1.1
D	4.0	Hot	3.0	1.5	1.2	1.2	1.3	3.0	4.0	1.6	1.2
C	3.0	4.0	3.0	1.9	1.5	1.4	1.2	1.7	1.7	1.3	1.0
B	3.0	3.0	4.0	11.0	2.0	1.4	1.4	1.6	4.0	5.0	1.6
A	1.9	1.9	1.8	1.7	1.2	1.3	1.3	1.2	1.9	12.0	1.3

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First Initial Survey, Trial No. 6
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	5.0	0.2	0.2	0.2	0.2	0.4	0.8	0.2	0.1	0.2	0.9
J	0.7	0.5	0.3	0.7	0.4	1.0	5.0	2.0	0.3	0.4	0.4
I	0.4	0.5	0.5	0.3	0.4	0.5	3.0	0.5	0.4	0.4	0.4
H	0.4	0.7	2.0	1.1	2.0	2.0	0.8	0.7	1.1	0.5	0.5
G	0.9	0.8	5.0	0.7	1.0	6.0	1.1	1.0	10.0	1.5	0.6
F	0.6	0.4	0.4	0.4	0.4	0.4	0.5	0.8	1.0	0.9	0.6
E	Hot	1.3	0.2	0.3	0.3	0.2	0.2	0.5	2.1	0.4	0.2
D	0.7	17.0	0.3	0.4	0.4	0.3	0.3	1.0	2.4	1.5	0.3
C	0.7	3.0	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3
B	0.3	0.7	0.5	0.7	0.3	0.2	0.2	0.4	2.0	0.2	0.3
A	0.5	0.7	1.0	0.6	0.4	0.4	0.2	0.2	2.0	5.0	0.4

INTENSITY (mr/hr) Three-foot Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	7.0	4.0	1.4	0.8	0.9	1.0	1.4	1.3	1.0	1.1	4.0
J	2.2	1.7	1.0	1.3	1.2	0.2	7.0	2.0	1.0	0.8	1.0
I	1.2	1.2	1.2	1.0	1.3	1.8	4.0	2.0	1.2	1.3	1.4
H	1.3	2.0	1.8	1.5	3.0	2.0	2.0	1.5	1.1	0.8	0.8
G	2.0	3.0	Hot	1.6	2.0	4.0	1.3	2.0	9.0	0.0	0.8
F	4.0	3.0	4.0	1.8	1.0	1.3	1.1	1.9	4.0	1.7	0.8
E	19.0	4.0	2.0	1.7	1.3	0.9	1.3	3.0	5.0	1.5	0.9
D	5.0	15.0	2.0	1.5	1.4	1.0	1.0	2.0	3.0	0.4	1.2
C	1.5	5.0	3.0	2.0	1.2	1.2	1.2	1.3	1.4	1.2	0.8
B	2.0	2.0	3.0	4.0	1.4	1.1	1.2	1.4	3.0	3.0	1.2
A	18.0	2.0	3.0	2.0	1.5	0.9	1.0	1.4	3.0	6.0	1.8

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Second Initial Survey, Trial No. 6
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	3.0	0.1	0.2	0.1	0.1	0.4	0.3	0.3	0.1	0.4	0.3
J	0.4	0.6	0.7	0.3	0.5	0.3	0.8	0.4	0.5	0.4	0.3
I	0.5	0.5	0.3	0.2	0.3	1.0	2.0	0.3	0.3	0.3	0.2
H	0.2	0.5	1.1	0.5	1.5	1.6	1.0	0.3	0.9	0.9	0.2
G	0.3	2.0	0.8	0.5	1.0	0.8	0.9	1.2	Hot	0.8	0.4
F	0.7	0.4	0.1	0.2	0.4	0.2	0.4	0.8	2.0	0.6	0.4
E	Hot	3.0	0.5	0.3	0.3	0.3	0.4	4.0	1.1	0.4	0.3
D	0.6	9.0	0.2	0.4	0.2	0.4	0.2	1.1	0.4	0.2	0.4
C	0.8	3.0	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.4	0.3
B	0.4	0.5	0.5	0.6	0.2	0.2	0.2	0.4	3.0	0.4	0.2
A	0.8	0.6	1.1	0.8	0.5	0.5	0.3	0.4	3.0	4.0	0.8

INTENSITY (mr/hr) Three-foot Level — Station Number											
	1	2	3	4	5	6	7	8	9	10	11
K	4.0	1.8	0.7	0.8	0.8	0.9	1.5	1.4	1.0	1.3	3.0
J	1.3	1.3	1.1	0.9	0.8	0.8	1.3	5.0	1.2	0.9	0.9
I	1.0	1.0	1.0	1.2	1.2	1.5	2.0	1.9	1.2	0.9	0.8
H	1.3	2.1	3.0	1.9	1.3	3.0	1.6	1.4	1.3	1.2	1.0
G	1.4	3.0	6.0	2.1	3.5	3.0	1.6	3.0	14.0	2.0	0.8
F	1.8	1.7	2.0	1.4	1.0	1.3	1.5	1.9	2.0	0.9	0.7
E	18.0	4.0	1.7	1.3	1.0	1.0	1.3	6.0	3.0	1.1	0.7
D	3.0	14.0	1.8	1.1	1.1	1.0	1.1	3.0	2.2	1.0	0.9
C	3.0	5.0	2.1	2.1	1.3	0.9	1.1	1.5	1.3	1.0	0.6
B	1.8	1.8	3.0	3.0	1.1	0.9	1.1	1.4	4.0	2.0	0.9
A	2.0	1.9	3.0	2.0	1.3	1.4	1.5	1.5	5.0	5.0	1.5

Final Survey, Trial No. 6
Intensity readings at two levels in mr/hr

INTENSITY (mr/hr) Ground Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
J	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
I	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
H	0.2	0.5	1.1	0.5	1.5	1.6	1.0	0.3	0.9	0.9	0.2
G	0.3	2.0	0.8	0.5	1.0	0.8	0.9	1.2	Hot	0.8	0.4
F	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.2
E	0.8	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2
D	Hot	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.3
C	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
B	0.2	0.4	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	1.5
A	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.8	7.0	0.7

INTENSITY (mr/hr) Three-foot Level	Station Number										
	1	2	3	4	5	6	7	8	9	10	11
K	0.5	0.5	0.4	0.4	0.4	0.4	0.2	0.2	0.4	0.4	0.8
J	0.7	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.7	1.0
I	0.6	0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6
H	0.5	0.4	0.5	0.3	0.3	0.5	0.4	0.4	0.5	0.5	0.5
G	0.6	0.5	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.6
F	1.0	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.4
E	1.8	0.6	0.5	0.6	0.5	0.5	0.4	0.4	0.6	0.5	0.5
D	4.0	0.7	0.6	0.6	0.5	0.5	0.3	0.4	0.3	0.6	0.5
C	1.1	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.6
B	1.2	3.0	1.2	0.8	0.5	0.5	0.8	0.8	1.1	1.3	1.7
A	1.5	1.2	1.3	1.2	1.0	0.8	1.0	1.3	1.9	6.0	2.0

APPENDIX II

CONTOUR DIAGRAMS

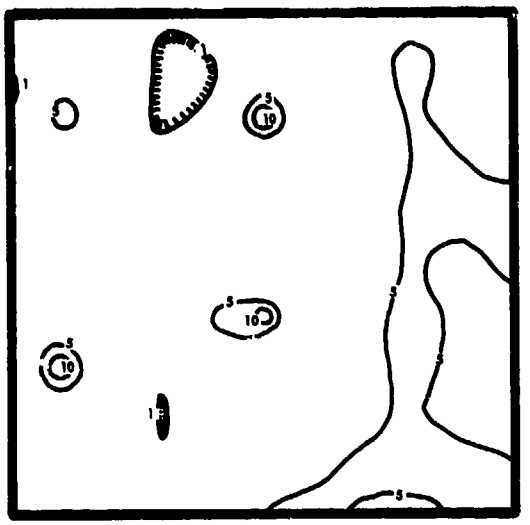

Fig. 1. – Preliminary Survey of Area 2 at Three-foot Level.

Manual Removal

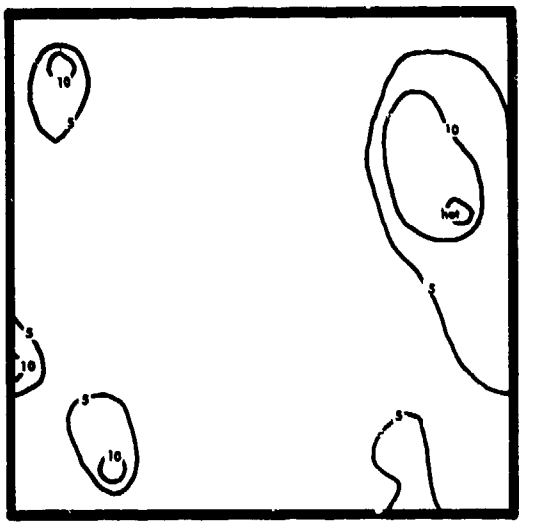

Fig. 2. – Preliminary Survey of Area 4 at Three-foot Level.

Moldboard Plow

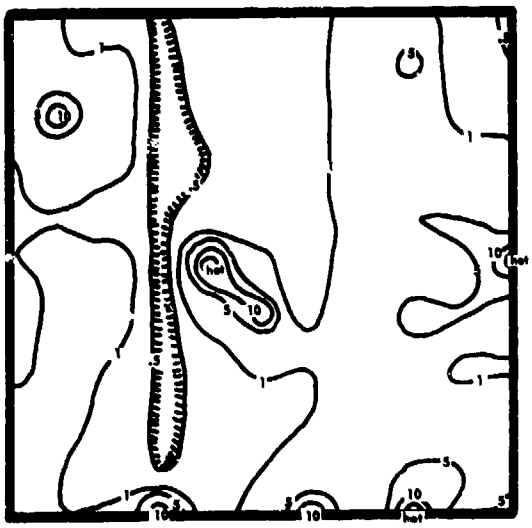

Fig. 3. – Preliminary Survey of Area 2 at Ground Level.

Manual Removal

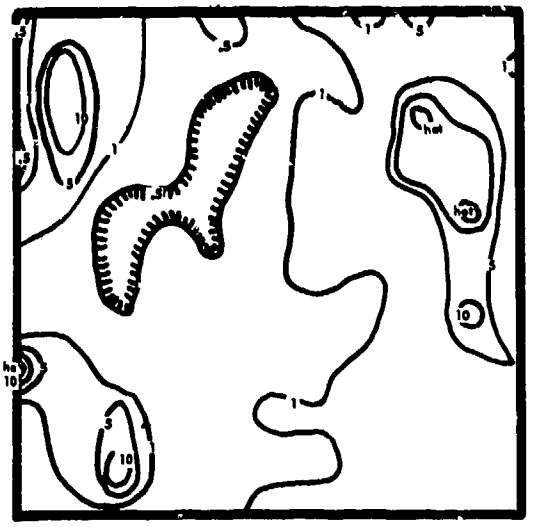

Fig. 4. – Preliminary Survey of Area 4 at Ground Level.

Moldboard Plow

Fig. 5. – Initial Survey of Area 2 at Three-foot Level.

Manual Removal

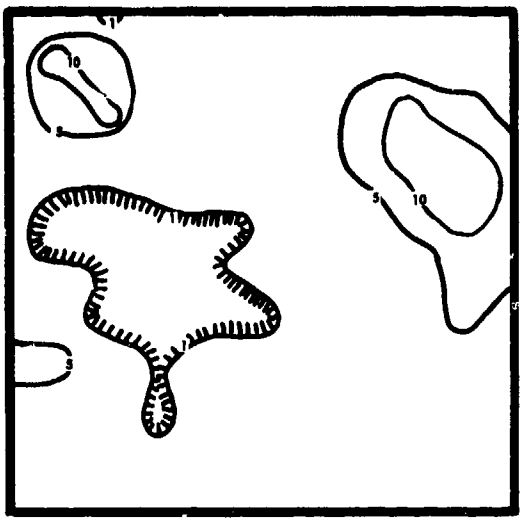

Fig. 6. – Initial Survey of Area 4 at Three-foot Level.

Moldboard Plow

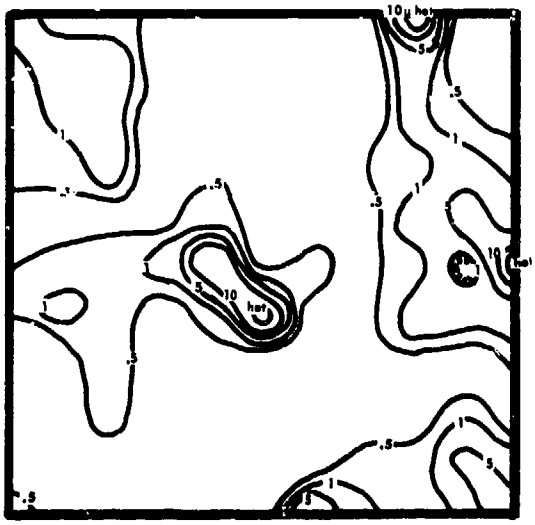

Fig. 7. – Initial Survey of Area 2 at Ground Level.

Manual Removal

Fig. 8. – Initial Survey of Area 4 at Ground Level.

Moldboard Plow

[redacted]

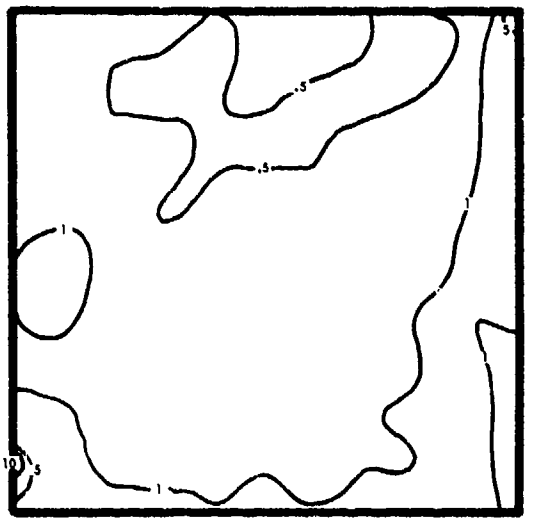

Fig. 9. – Final Survey of Area 2
at Three-foot Level.

Manual Removal

Fig. 10. – Final Survey of Area 4
at Three-foot Level.

Moldboard Plow

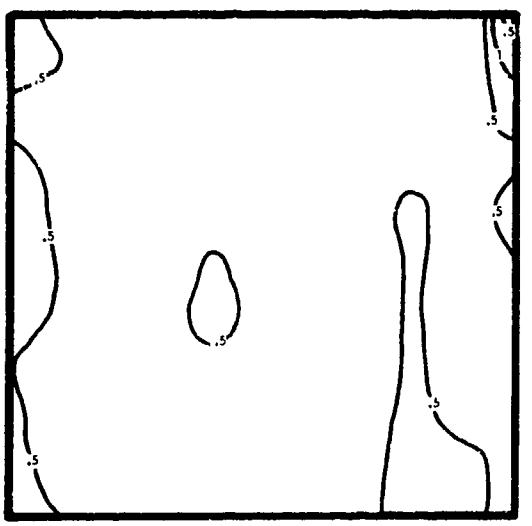

Fig. 11. – Final Survey of Area 2
at Ground Level.

Manual Removal

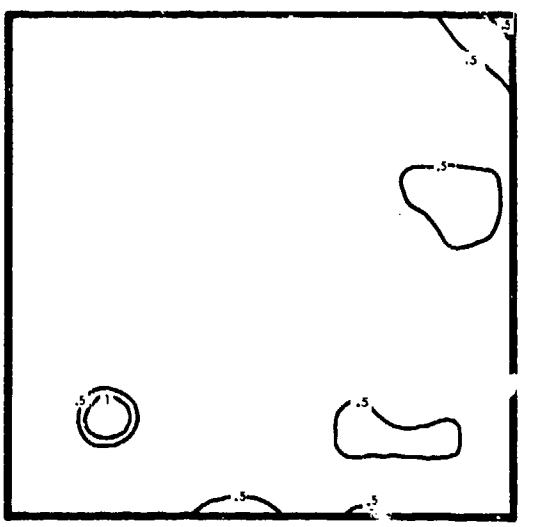

Fig. 12. – Final Survey of Area 4
at Ground Level.

Moldboard Plow

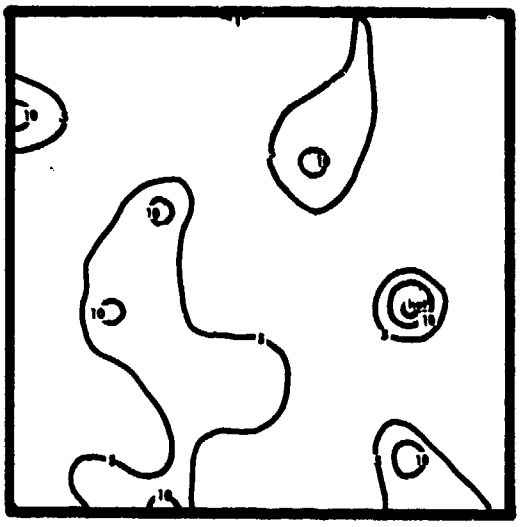

Fig. 13. – Preliminary Survey of Area 3 at Three-foot Level.
Disk Harrow

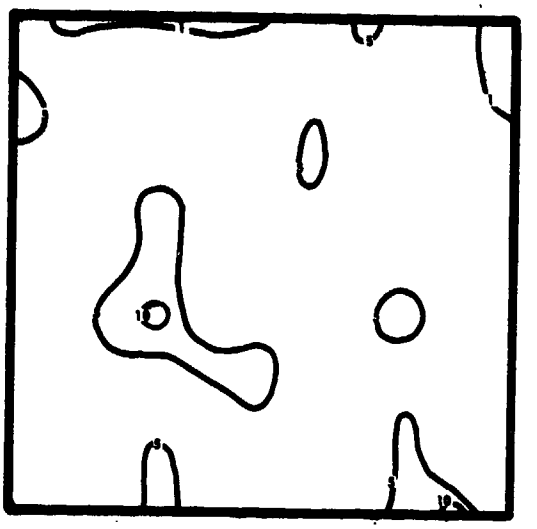

Fig. 14. – First Initial Survey of Area 3 at Three-foot Level.
Disk Harrow

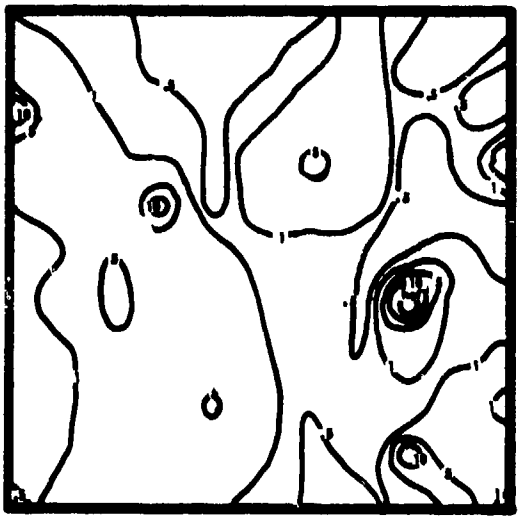

Fig. 15. – Preliminary Survey of Area 3 at Ground Level.
Disk Harrow

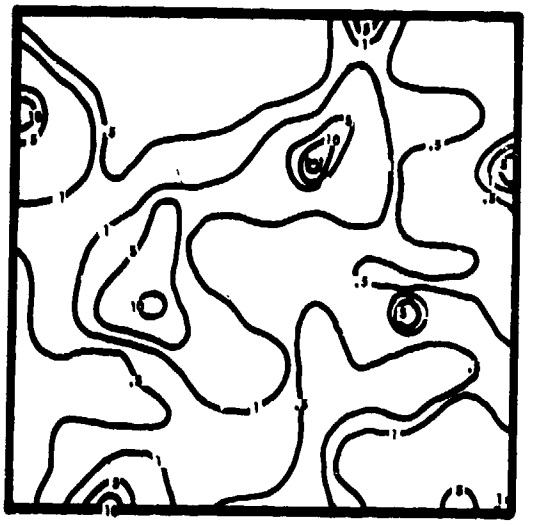

Fig. 16. – First Initial Survey of Area 3 at Ground Level.
Disk Harrow

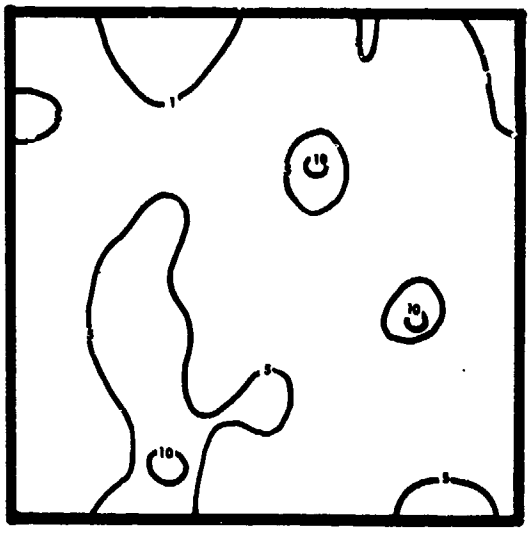

Fig. 17. – Second Initial Survey of Area 3 at Three-foot Level.
Disk Harrow

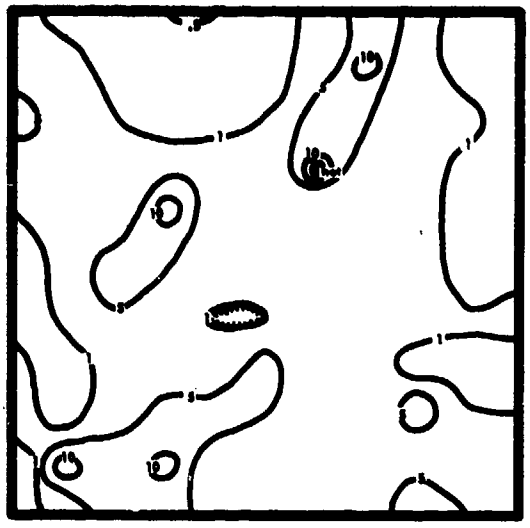

Fig. 18. – Final Survey of Area 3 at Three-foot Level.
Disk Harrow

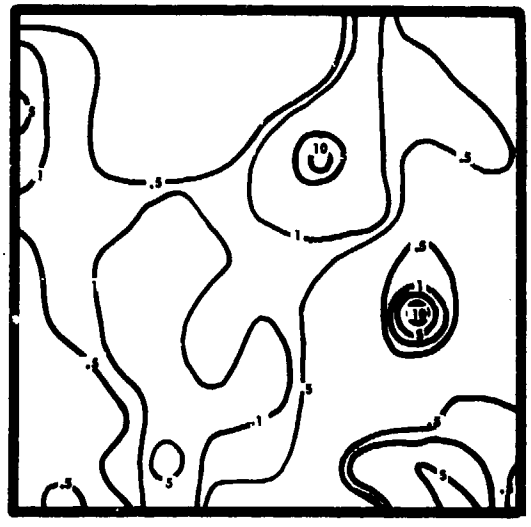

Fig. 19. – Second Initial Survey of Area 3 at Ground Level.
Disk Harrow

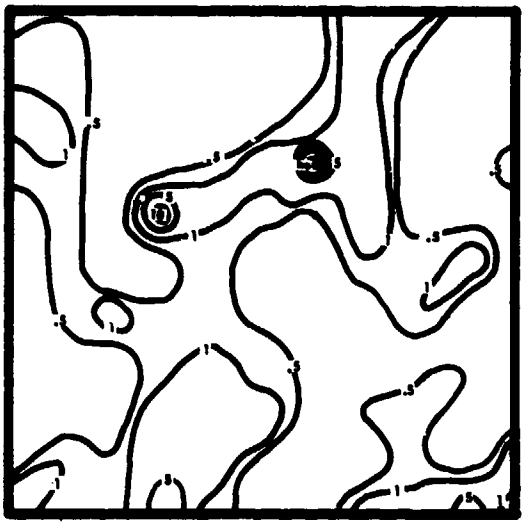

Fig. 20. – Final Survey of Area 3 at Ground Level.
Disk Harrow

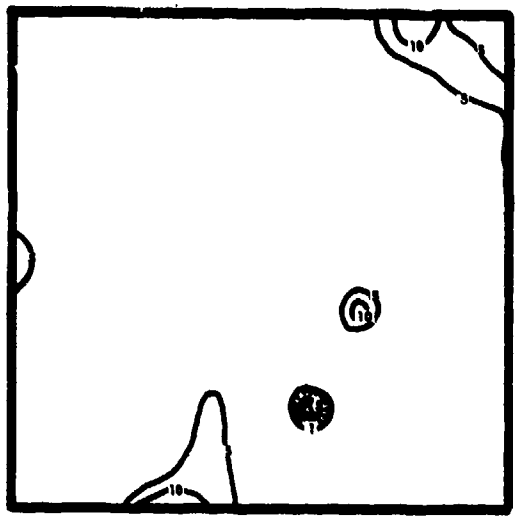

Fig. 21. – Preliminary Survey of Area 5 at Three-foot Level.

Motor Grader

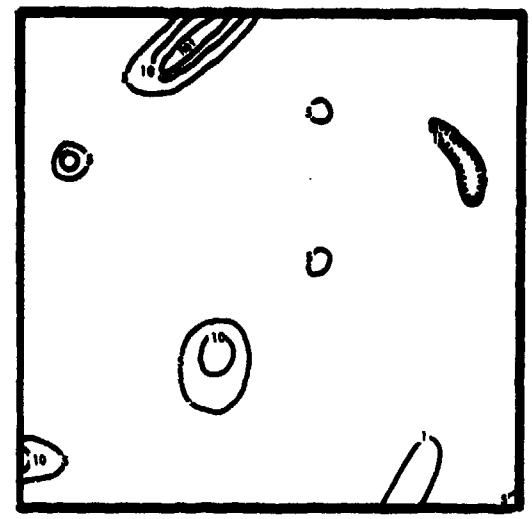

Fig. 22. – Preliminary Survey of Area 6 at Three-foot Level.

Scraper

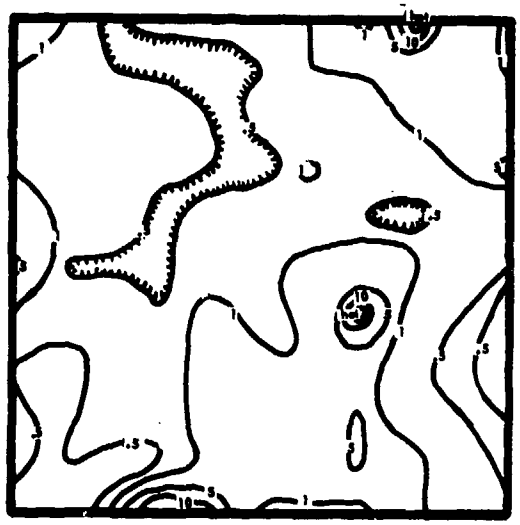

Fig. 23. – Preliminary Survey of Area 5 at Ground Level.

Motor Grader

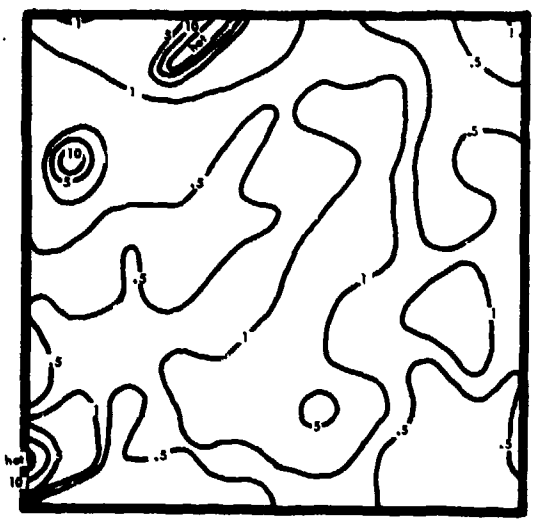

Fig. 24. – Preliminary Survey of Area 6 at Ground Level.

Scraper

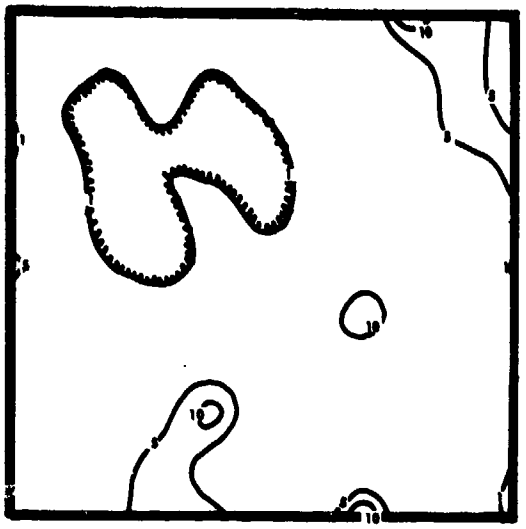

Fig. 25. – Initial Survey of Area 5 at Three-foot Level.
Motor Grader

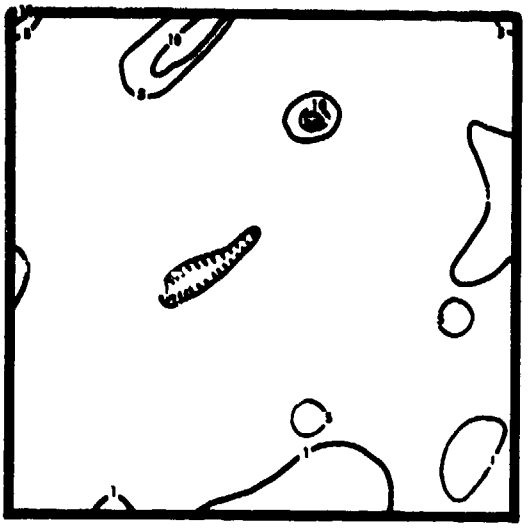

Fig. 26. – First Initial Survey of Area 6 at Three-foot Level.
Scraper

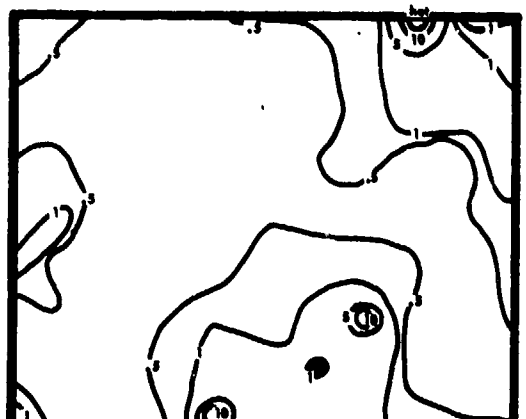

Fig. 27. – Initial Survey of Area 5 at Ground Level.
Motor Grader

Fig. 28. – First Initial Survey of Area 6 at Ground Level.
Scraper

Fig. 29. – First Final Survey of Area 5 at Three-foot Level.
Motor Grader

Fig. 30. – Second Initial Survey of Area 6 at Three-foot Level.
Scraper

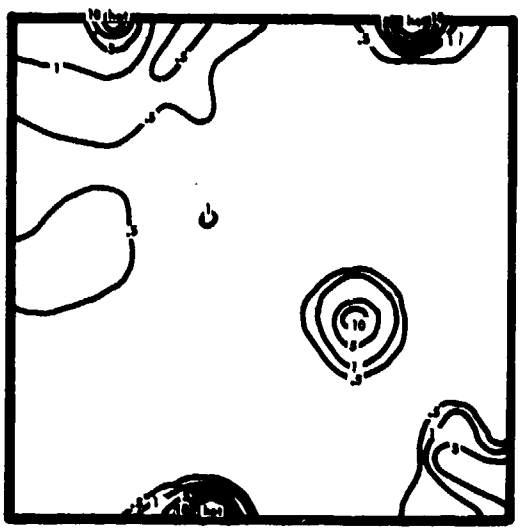

Fig. 31. – First Final Survey of Area 5 at Ground Level.
Motor Grader

Fig. 32. – Second Initial Survey of Area 6 at Ground Level.
Scraper

Fig. 33. – Second Final Survey of Area 5 at Three-foot Level.
Motor Grader

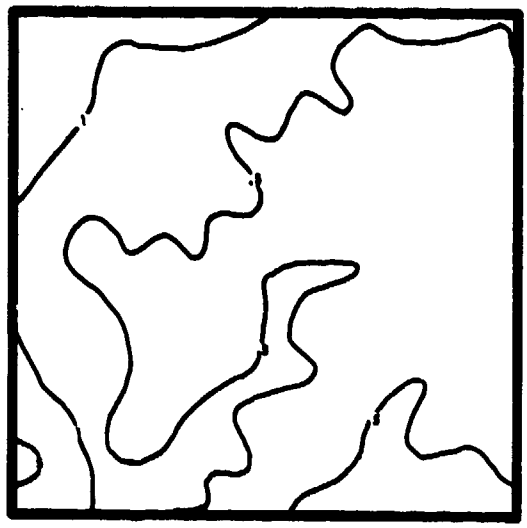

Fig. 34. – Final Survey of Area 6 at Three-foot Level.
Scraper

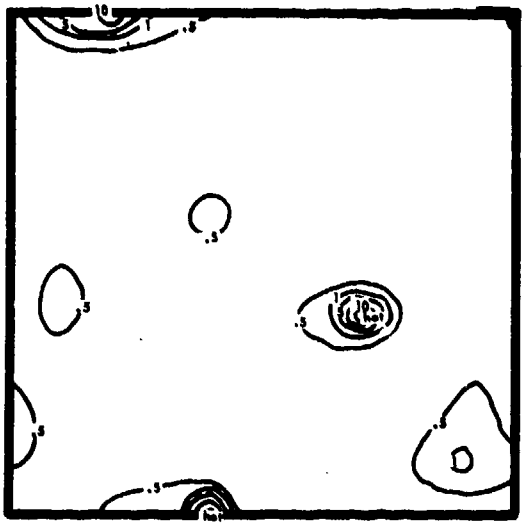

Fig. 35. – Second Final Survey of Area 5 at Ground Level.
Motor Grader

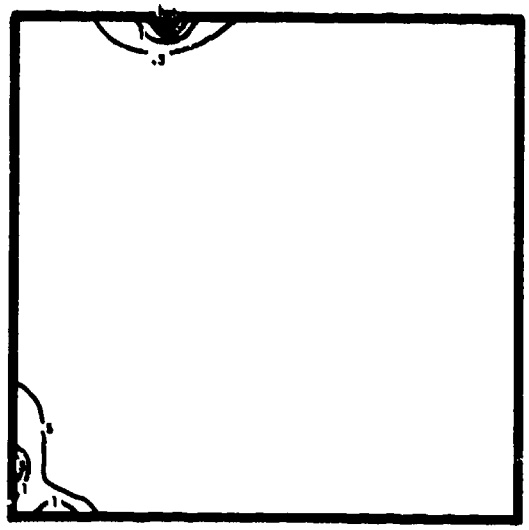

Fig. 36. – Final Survey of Area 6 at Ground Level.
Scraper

APPENDIX III

STATISTICAL ANALYSIS OF DECONTAMINATION METHODS

STATISTICAL ANALYSIS OF DECONTAMINATION PROCEDURES

The table given below is calculated from the field data contained in Appendix I. The initial intensities, I, are the field measurements of areas prior to treatment by decontamination processes; the final intensities, F, are the field measurements after completion of decontamination procedures. The decontamination coefficient is defined by

$$D = \frac{F}{I} .$$

The values of x_i and y_i are given by the following transformation:

$$x_i = \log_e 100\ I_i$$

$$y_i = \log_e 100\ D_i$$

in which i corresponds to the station at which a field measurement was taken. A regression line $y' = \hat{a} + \hat{b}x$ was fitted to the data by the method of least squares. This fit was made by minimizing

$$\sum_1^N \left(y_i - y' \right)^2 = \sum_1^N \left(y_i - \hat{a} - \hat{b}x_i \right)^2 . \qquad (1)$$

This was accomplished by partial differentiation of (1) with respect to $\hat{a}$ and $\hat{b}$, and setting the derivatives equal to zero.

Thus the following normal equations are obtained:

$$\hat{a}N + \hat{b}\sum_{1}^{N} x_i = \sum_{1}^{N} y_i \qquad (2)$$

$$\hat{a}\sum_{1}^{N} x_i + \hat{b}\sum_{1}^{N} x_i^2 = \sum_{1}^{N} x_i y_i \,. \qquad (3)$$

Solving (2) and (3) for $\hat{a}$ and $\hat{b}$ gives

$$\hat{b} = \frac{N\sum_{1}^{N} x_i y_i - \sum_{1}^{N} x_i \sum_{1}^{N} y_i}{N\sum_{1}^{N} x^2 - \left[\sum_{1}^{N} x\right]^2} \qquad (4)$$

$$\hat{a} = \bar{y} - \hat{b}\bar{x} \qquad (5)$$

where $\bar{y}$ and $\bar{x}$ are the mean values of y_i's and x_i's, respectively. From Tables 2-6 and the above relations, the equations of Table 1 are obtained corresponding to the different trials and heights.

TABLE 1: Equations for regression lines

Trial	Ground Level	3 - foot Level
2	y = 7.9004 - .9208x	y = 8.7365 - .9397x
3	y = 6.1229 - .3985x	y = 4.0003 - .0602x
4	y = 6.9472 - .7470x	y = 6.9101 - .5983x
5	y = 8.3195 - 1.0782x	y = 8.8709 - .9217x
6	y = 7.2175 - .8866x	y = 7.3582 - .7445x

These equations are graphed in Figures 1-9. The goodness of fit of each of these regression lines was tested by an analysis of variance. This analysis indicates how much the regression line has reduced the variance in y. The variance of the y_i's about the regression line is known as the residual variance or the variance of estimate. The ratio of the variance in the y_i's about the $\bar{y}$ value to the residual variance was then tested for significance. In all cases except the three-foot level of trial 3, the ratios were significant with a probability greater than .995, (i.e. in less than five cases out of 1000 could such large variance ratios be obtained by chance alone). For the three-foot level of trial 3 the value of b was not significantly different from zero at the 90 per cent confidence level, and therefore the calculated regression line reveals nothing more about the variance of the y's than the mean of y's indicates. A regression line was consequently not plotted for the three-foot level of trial 3. In this case the value of D corresponding to $\bar{y}$ is the practical representation of the scatter pattern shown in Figure 13.

On the graphs of decontamination coefficient versus initial intensity, linear 90 per cent confidence limits on the regression line are shown as dotted lines. These limits mean that a randomly-selected point from this system has a .90 probability of being inside the confidence band.

When two methods of decontamination are compared, a test of

significant difference is valuable. The sampling error of the regression coefficient $\hat{b}$ is given by

$$S_b = \frac{S_e}{\sqrt{\Sigma (x-\bar{x})^2}}$$

where S_e is the standard deviation for residual error. Assuming that the sample $\hat{b}$'s are distributed normally, the test for the significance of the difference between two $\hat{b}$'s is based on their respective standard errors. Thus for $\hat{b}_1$ and $\hat{b}_2$ with standard errors S_{b_1} and S_{b_2}, the standard error of the difference would be

$$S_{(b_1 - b_2)} = \sqrt{S_{b_1}^2 - S_{b_2}^2},$$

and the t test value is

$$t = \frac{\left|\hat{b}_1 - \hat{b}_2\right|}{S_{(b_1 - b_2)}}$$

for $N_1 + N_2 - 4$ degrees of freedom. Values of t were calculated for all pairs of trials and tested for significance. Similar tests were performed on the $\hat{a}$'s for all pairs of trials. It was found that there was a significant difference with a probability greater than .95 for all cases except at the ground levels of trials 4 and 6 and at the three-foot levels of trials 2 and 5.

The scatter diagrams of D versus I permit visual observation of the uniformity of any decontamination treatment. The numbers

TABLE 2. Initial Intensities and Decontamination Coefficient for Trial 2 at the ground and three - foot levels

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
A1	110	100	4.70	4.61	1200	4	7.09	1.39
A2	90	89	4.50	4.49	160	62	5.08	4.13
A3	50	80	3.91	4.38	110	55	4.70	4.01
A4	60	133	4.09	4.89	100	90	4.61	4.50
A5	40	175	3.69	5.16	100	80	4.61	4.38
A6	50	160	3.91	5.08	170	59	5.14	4.08
A7	50	140	3.91	4.94	170	59	5.14	4.08
A8	40	125	3.69	4.83	110	64	4.70	4.16
A9	50	120	3.91	4.79	130	154	4.87	5.04
A10	40	200	3.69	5.30	200	950	5.30	6.86
A11	90	333	4.50	5.81	40	1000	3.69	6.91
B1	70	43	4.25	3.76	140	50	4.94	3.91
B2	210	24	5.35	3.18	300	27	5.70	3.30
B3	400	8	5.99	2.00	400	15	5.99	2.71
B4	90	33	4.50	3.50	110	73	4.70	4.29
B5	30	133	3.40	4.89	100	90	4.61	4.50
B6	70	71	4.25	4.26	30	433	3.40	6.07
B7	190	26	5.25	3.26	400	28	5.99	3.33
B8	30	100	3.40	4.61	150	53	5.01	3.97
B9	40	75	3.69	4.32	140	78	4.94	4.36
B10	20	150	3.00	5.01	180	78	5.19	4.36
B11	40	125	3.69	4.83	120	116	4.79	4.75
C1	60	33	4.09	3.50	110	55	4.70	4.01
C2	200	10	5.30	2.30	300	17	5.70	2.83
C3	300	66	5.70	4.19	400	12	5.99	2.48
C4	110	18	4.70	2.89	140	43	4.94	3.76
C5	40	25	3.69	3.22	90	67	4.50	4.20
C6	90	44	4.50	3.78	210	29	5.35	3.37
C7	70	29	4.25	3.37	200	30	5.30	3.40
C8	80	25	4.38	3.22	160	44	5.08	3.78
C9	60	33	4.09	3.50	170	47	5.14	3.85
C10	40	50	3.69	3.91	110	82	4.70	4.41
C11	40	75	3.69	4.32	160	81	5.08	4.39
D1	30	100	3.40	4.61	70	114	4.25	4.74
D2	30	100	3.40	4.61	110	45	4.70	3.81
D3	30	67	3.40	4.20	100	50	4.61	3.91
D4	30	67	3.40	4.20	150	40	5.01	3.69
D5	30	100	3.40	4.61	210	19	5.35	2.94
D6	400	8	5.99	2.08	200	35	5.30	3.56
D7	20	150	3.00	5.01	120	58	4.79	4.06

Continued

TABLE 2: Initial Intensities and Decontamination Coefficient for Trial 2 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
D8	30.	100.	3.40	4.60	100	60	4.61	4.09
D9	40.	75	3.69	4.32	110	55	4.70	4.01
D10	30.	100.	3.40	4.61	80	88	4.38	4.48
D11	30.	100.	3.40	4.61	110	182	4.70	5.20
E1	50	80	3.91	4.38	90	56	4.50	4.03
E2	40	100	3.69	4.61	100	40	4.61	3.69
E3	50	40	3.91	3.69	60	83	4.09	4.42
E4	40	50	3.69	3.91	110	45	4.70	3.81
E5	60	33	4.09	3.50	150	47	5.01	3.85
E6	1700	4	7.44	1.39	700	11	6.55	2.40
E7	70	143	4.25	4.96	300	37	5.70	3.61
E8	30	133	3.40	4.89	100	70	4.61	4.25
E9	40	125	3.69	4.83	120	67	4.79	4.20
E10	40	50	3.69	3.91	120	67	4.79	4.20
E11	40	125	3.69	4.83	150	67	5.01	4.20
F1	10	300	2.30	5.70	70	86	4.25	4.45
F2	10	200	2.30	5.30	60	117	4.09	4.76
F3	10	300	2.30	5.70	60	83	4.09	4.42
F4	20	100	3.00	4.61	80	62	4.38	4.12
F5	20	150	3.00	5.01	90	67	4.50	4.20
F6	20	150	3.00	5.01	130	62	4.87	4.13
F7	—	—	—	—	1000	8	6.91	2.08
F8	40	100	3.69	4.61	170	47	5.14	3.85
F9	20	150	3.00	5.01	110	73	4.70	4.29
F10	20	150	3.00	5.01	90	100	4.50	4.61
F11	20	200	3.00	5.30	100	140	4.61	4.94
G1	20	150	3.00	5.01	100	70	4.61	4.25
G2	30	100	3.40	4.61	90	56	4.50	4.03
G3	30	67	3.40	4.20	80	50	4.38	3.91
G4	30	100	3.40	4.61	80	62	4.38	4.12
G5	40	75	3.69	4.32	110	64	4.70	4.16
G6	50	40	3.91	3.69	110	45	4.70	3.81
G7	40	75	3.69	4.32	170	47	5.14	3.85
G8	60	50	4.09	3.91	110	73	4.70	4.29
G9	40	100	3.69	4.61	100	90	4.61	4.50
G10	40	75	3.69	4.32	300	30	5.70	3.40
G11	800	4	6.68	1.39	1100	9	7.00	2.20
H1	20	150	3.00	5.01	300	17	5.70	2.83
H2	20	150	3.00	5.01	190	26	5.25	3.26

Continued

TABLE 2: Initial Intensities and Decontamination Coefficient for Trial 2 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_1	y_1	100 I	100 D	x_1	y_1
H3	20	100	3.00	4.61	160	31	5.08	3.43
H4	50	60	3.91	4.09	180	33	5.20	3.50
H5	40	50	3.69	3.91	160	38	5.08	3.64
H6	40	75	3.69	4.32	150	47	5.01	3.85
H7	40	100	3.69	4.61	170	47	5.14	3.85
H8	40	75	3.69	4.32	170	47	5.14	3.85
H9	40	100	3.69	4.61	170	59	5.14	4.08
H10	70	43	4.25	3.76	200	50	5.30	3.91
H11	110	36	4.70	3.58	300	37	5.70	3.61
I1	---	--	----	----	---	--	----	----
I2	200	20	5.30	3.00	800	5	6.68	1.61
I3	100	40	4.61	3.69	500	10	6.21	2.30
I4	70	71	4.25	4.26	600	10	6.40	2.30
I5	300	20	5.70	3.00	900	9	6.80	2.20
I6	70	71	4.25	4.26	500	14	6.21	2.64
I7	300	17	5.70	2.83	1000	10	6.91	2.30
I8	30	167	3.40	5.12	200	40	5.30	3.69
I9	40	150	3.69	5.01	190	100	5.25	4.61
I10	70	100	4.25	4.61	900	11	6.80	2.40
I11	90	78	4.50	4.36	500	24	6.21	3.18
J1	40	50	3.69	3.91	190	26	5.25	3.26
J2	40	50	3.69	3.91	220	27	5.39	3.30
J3	50	40	3.91	3.69	200	35	5.30	3.56
J4	130	23	4.87	3.14	500	16	6.21	2.77
J5	600	5	6.40	1.61	700	14	6.55	2.64
J6	80	38	4.38	3.64	500	26	6.21	3.26
J7	140	28	4.94	3.33	600	18	6.40	2.89
J8	40	75	3.69	4.32	200	65	5.30	4.17
J9	100	30	4.61	3.40	400	35	5.99	3.56
J10	600	12	6.40	2.48	1100	15	7.00	2.71
J11	100	70	4.61	4.25	600	33	6.40	3.50
K1	10	6000	2.30	8.70	120	667	4.79	6.50
K2	20	1000	3.00	6.91	110	273	4.70	5.61
K3	40	175	3.69	5.16	170	112	5.14	4.72
K4	60	67	4.09	4.20	400	50	5.99	3.91
K5	300	27	5.70	3.30	600	37	6.40	3.61
K6	---	--	----	----	1800	11	7.50	2.40
K7	400	10	5.99	2.30	300	43	5.70	3.76
K8	50	60	3.91	4.09	300	30	5.70	3.40

Continued

TABLE 2: Initial Intensities and Decontamination Coefficient for Trial 2 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
K9	40	75	3.69	4.32	300	27	5.70	3.30
K10	400	5	5.99	1.61	900	8	6.80	2.08
K11	700	3	6.55	1.10	1400	4	7.24	1.39
Σx_i = 477.97		Σy_i = 492.13			Σx_i = 632.06		Σy_i = 454.43	
Σx_i^2 = 2046.2021		Σy_i^2 = 2185.7497			Σx_i^2 = 3408.5690		Σy_i^2 = 1828.5277	
$\Sigma x_i y_i$ = 1892.0117					$\Sigma x_i y_i$ = 2318.9548			
N = 118					N = 120			

The values in these tables were derived from second initial or second final surveys whenever two initial or two final surveys were taken.

TABLE 3: Initial Intensities and Decontamination Coefficient for Trial 3 at the ground and three - foot levels

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
A1	20	200	3.00	5.30	300	100	5.70	4.61
A2	160	50	5.08	3.91	400	75	5.99	4.32
A3	800	38	6.68	3.64	800	112	6.68	4.72
A4	300	27	5.70	3.30	400	75	5.99	4.32
A5	80	50	4.38	3.91	170	59	5.14	4.08
A6	20	100	3.00	4.61	180	50	5.19	3.91
A7	40	50	3.69	3.91	140	57	4.94	4.04
A8	20	200	3.00	5.30	130	115	4.87	4.74
A9	20	100	3.00	4.61	130	92	4.87	4.52
A10	40	25	3.69	3.22	170	6	5.14	1.79
A11	20	2000	3.00	7.60	200	200	5.30	5.30
B1	40	125	3.69	4.83	140	57	4.94	4.04
B2	60	117	4.09	4.76	190	105	5.25	4.65
B3	80	125	4.38	4.83	500	80	6.21	4.38
B4	80	125	4.38	4.83	300	67	5.70	4.20
B5	60	100	4.09	4.61	190	84	5.25	4.43
B6	60	117	4.09	4.76	280	57	5.63	4.04
B7	60	83	4.09	4.42	210	62	5.35	4.13
B8	30	133	3.40	4.89	210	38	5.35	3.64
B9	40	75	3.69	4.32	190	47	5.25	3.85
B10	40	250	3.69	5.52	300	433	5.70	6.07
B11	80	62	4.38	4.14	400	40	5.99	3.69
C1	30	67	3.40	4.20	90	89	4.50	4.49
C2	40	50	3.69	3.91	100	90	4.61	4.50
C3	20	50	3.00	3.91	150	67	5.01	4.20
C4	40	50	3.69	3.91	190	74	5.25	4.30
C5	80	38	4.30	3.64	200	100	5.30	4.61
C6	150	20	5.01	3.00	600	100	6.40	4.61
C7	400	75	5.99	4.32	1000	50	6.91	3.91
C8	100	30	4.61	3.40	600	67	6.40	4.20
C9	40	75	3.69	4.32	300	63	5.70	4.14
C10	60	83	4.09	4.42	400	150	5.99	5.01
C11	30	267	3.40	5.59	800	88	6.68	4.47
D1	10	100	2.30	4.61	70	71	4.25	4.26
D2	10	100	2.30	4.61	80	86	4.30	4.45
D3	20	50	3.00	3.91	100	80	4.61	4.38
D4	40	25	3.69	3.22	170	88	5.14	4.48
D5	200	650	5.30	6.48	800	136	6.68	4.91
D6	200	10	5.30	2.30	500	100	6.21	4.61

Continued

TABLE 3: Initial Intensities and Decontamination Coefficient for Trial 3 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
D7	300	17	5.70	2.83	700	43	6.55	3.76
D8	120	67	4.79	4.20	600	67	6.40	4.20
D9	300	133	5.70	4.89	700	100	6.55	4.61
D10	600	67	6.40	4.20	1200	92	7.09	4.52
D11	400	175	5.99	5.16	900	100	6.80	4.61
E1	---	---	----	----	80	62	4.38	4.13
E2	20	200	3.00	5.30	100	70	4.61	4.25
E3	10	400	2.30	5.99	130	62	4.87	4.13
E4	20	250	3.00	5.52	190	63	5.25	4.14
E5	60	300	4.09	5.70	200	100	5.30	4.61
E6	120	50	4.79	3.91	400	38	5.99	3.64
E7	80	75	4.38	4.32	300	30	5.70	3.40
E8	60	500	4.09	6.21	400	75	5.99	4.32
E9	400	125	5.99	4.83	500	120	6.21	4.79
E10	80	375	4.38	5.93	400	100	5.99	4.61
E11	20	450	3.00	6.11	200	95	5.30	4.55
F1	20	100	3.00	4.61	130	46	4.87	3.83
F2	30	67	3.40	4.20	160	50	5.08	3.91
F3	40	50	3.69	3.91	210	48	5.35	3.67
F4	300	53	5.70	3.97	400	75	5.99	4.32
F5	160	50	5.08	3.91	200	95	5.30	4.55
F6	70	43	4.25	3.76	240	67	5.48	4.20
F7	100	40	4.61	3.69	210	40	5.35	3.87
F8	130	46	4.87	3.83	500	120	6.21	4.79
F9	190	158	5.25	5.06	700	71	6.55	4.26
F10	80	50	4.38	3.91	200	95	5.30	4.55
F11	40	100	3.69	4.61	180	83	5.19	4.42
G1	10	300	2.30	5.70	120	108	4.79	4.68
G2	10	200	2.30	5.30	150	127	5.01	4.84
G3	300	27	5.70	3.30	400	150	5.99	5.01
G4	----	----	-----	-----	---	---	----	----
G5	300	17	5.70	2.83	500	36	6.21	3.58
G6	60	33	4.09	3.50	200	60	5.30	4.09
G7	20	100	3.00	4.61	200	60	5.30	4.09
G8	40	100	3.69	4.61	200	100	5.30	4.61
G9	20	100	3.00	4.61	300	67	5.70	4.20
G10	20	50	3.00	3.91	190	79	5.25	4.37
G11	20	100	3.00	4.61	150	100	5.01	4.61
H1	160	500	5.08	6.21	500	140	6.21	4.94

Continued

TABLE 3: Initial Intensities and Decontamination Coefficient for Trial 3 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
H2	160	125	5.08	4.83	500	300	6.21	5.70
H3	100	200	4.61	5.30	210	238	5.35	5.47
H4	130	154	4.87	5.04	400	75	5.99	4.32
H5	210	95	5.35	4.55	160	125	5.08	4.83
H6	40	250	3.69	5.52	280	107	5.64	4.67
H7	30	133	3.40	4.89	400	75	5.99	4.32
H8	30	67	3.40	4.20	200	60	5.30	4.09
H9	20	250	3.00	5.52	300	50	5.70	3.91
H10	160	25	5.00	3.22	300	50	5.70	3.91
H11	40	325	3.69	5.78	300	67	5.70	4.20
I1	40	500	3.69	6.21	400	100	5.99	4.61
I2	70	71	4.25	4.26	300	100	5.70	4.61
I3	70	43	4.25	3.76	300	100	5.70	4.61
I4	10	200	2.30	5.30	150	93	5.01	4.53
I5	20	150	3.00	5.01	150	87	5.01	4.47
I6	70	86	4.25	4.45	400	100	5.99	4.61
I7	1500	7	7.31	1.95	1200	33	7.09	3.50
I8	40	50	3.69	3.91	170	53	5.14	3.97
I9	10	800	2.30	6.68	400	225	5.99	5.42
I10	500	10	6.21	2.30	400	100	5.99	4.61
I11	200	150	5.30	5.01	600	100	6.40	4.61
J1	20	100	3.00	4.61	100	50	4.61	3.91
J2	30	33	3.40	3.50	110	82	4.70	4.41
J3	70	57	4.25	4.04	180	67	5.19	4.20
J4	50	40	3.91	3.69	160	50	5.08	3.91
J5	30	33	3.40	3.50	150	33	5.01	3.50
J6	40	375	3.69	5.93	210	38	5.35	3.64
J7	30	33	3.40	3.50	160	62	5.08	4.14
J8	20	250	3.00	5.52	210	38	5.35	3.64
J9	90	22	4.50	3.09	300	33	5.70	3.50
J10	150	27	5.01	3.30	400	38	5.99	3.64
J11	700	100	6.55	4.61	800	63	6.68	4.14
K1	----	----	----	----	60	100	4.09	4.61
K2	50	40	3.91	3.69	80	100	4.38	4.61
K3	10	200	2.30	5.30	90	89	4.50	4.49
K4	50	140	3.91	4.94	130	154	4.87	5.04
K5	10	200	2.30	5.30	120	75	4.79	4.32
K6	10	200	2.30	5.30	200	45	5.30	3.81
K7	20	200	3.00	5.30	140	107	4.94	4.67

Continued

TABLE 3: Initial Intensities and Decontamination Coefficient for Trial 3 (Continued)

Station Numbers	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
K8	40	50	3.69	3.91	140	64	4.94	4.16
K9	50	40	3.91	3.69	150	67	5.01	4.20
K10	50	600	3.91	6.40	300	133	5.70	4.89
K11	10	500	2.30	6.21	300	100	5.70	4.61

$\Sigma x_i = 475.77$ $\Sigma y_i = 533.74$ $\Sigma x_i = 661.80$ $\Sigma y_i = 519.87$

$\Sigma x_i^2 = 2061.4537$ $\Sigma y_i^2 = 2529.2494$ $\Sigma x_i^2 = 3700.1534$ $\Sigma y_i^2 = 2283.1841$

$\Sigma x_i y_i = 2094.9458$ $\Sigma x_i y_i = 2870.1466$

N = 118 N = 120

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TABLE 4: Initial Intensities and Decontamination Coefficient for Trial 4 at the ground and three - foot levels

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
A1	20	150	3.00	5.01	130	31	4.87	3.43
A2	20	100	3.00	4.61	300	13	5.70	2.56
A3	40	50	3.69	3.91	160	31	5.08	3.43
A4	10	300	2.30	5.70	140	36	4.94	3.58
A5	200	10	5.30	2.30	120	42	4.79	3.74
A6	20	150	3.00	5.01	110	73	4.70	4.29
A7	60	33	4.09	3.50	300	17	5.70	2.83
A8	100	20	4.61	3.00	1000	12	6.91	2.40
A9	10	200	2.30	5.30	180	28	5.19	3.33
A10	40	50	3.69	3.91	130	54	4.87	3.99
A11	20	100	3.00	4.61	100	90	4.61	4.50
B1	60	50	4.09	3.91	160	38	5.08	3.64
B2	---	---	-----	-----	1300	8	7.16	2.08
B3	50	60	3.91	4.09	600	27	6.40	3.30
B4	10	300	2.30	5.70	130	46	4.87	3.83
B5	20	100	3.00	4.61	80	50	4.38	3.91
B6	20	100	3.00	4.61	80	50	4.38	3.91
B7	20	100	3.00	4.61	130	38	4.87	3.64
B8	20	10	3.00	2.30	600	10	6.40	2.30
B9	10	200	2.30	5.30	400	15	5.99	2.71
B10	70	29	4.25	3.37	300	23	5.70	3.14
B11	20	150	3.00	5.01	120	67	4.79	4.20
C1	80	25	4.38	3.22	60	83	4.09	4.42
C2	110	45	4.70	3.81	600	23	6.40	3.14
C3	1100	2	7.00	0.69	1100	9	7.00	2.20
C4	70	43	4.25	3.76	150	93	5.01	4.53
C5	30	67	3.40	4.20	90	44	4.50	3.78
C6	30	67	3.40	4.20	100	50	4.61	3.91
C7	30	67	3.40	4.20	80	50	4.38	3.91
C8	30	67	3.40	4.20	130	38	4.87	3.64
C9	400	125	5.99	4.83	300	33	5.70	3.50
C10	400	5	5.99	1.61	400	25	5.99	3.22
C11	110	27	4.70	3.30	200	40	5.30	3.69
D1	40	100	3.69	4.61	110	73	4.70	4.29
D2	40	50	3.69	3.91	150	33	5.01	3.50
D3	100	20	4.61	3.00	200	25	5.30	3.22
D4	60	33	4.09	3.50	130	31	4.87	3.43
D5	40	50	3.69	3.91	100	40	4.61	3.69
D6	30	67	3.40	4.20	90	44	4.50	3.78
D7	30	67	3.40	4.20	70	57	4.25	4.04
D8	40	50	3.69	3.91	100	40	4.61	3.69

Continued

TABLE 4: Initial Intensities and Decontamination Coefficient for Trial 4 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
D9	30	67	3.40	4.20	90	78	4.50	4.36
D10	40	50	3.69	3.91	110	64	4.70	4.16
D11	50	60	3.91	4.09	120	67	4.79	4.20
E1	20	150	3.00	5.01	120	50	4.79	3.91
E2	20	100	3.00	4.61	130	38	4.87	3.64
E3	20	100	3.00	4.61	110	45	4.70	3.81
E4	20	100	3.00	4.61	120	33	4.79	3.50
E5	40	50	3.69	3.91	100	50	4.61	3.91
E6	40	50	3.69	3.91	100	50	4.61	3.91
E7	20	100	3.00	4.61	90	44	4.50	3.78
E8	20	100	3.00	4.61	120	58	4.79	4.06
E9	40	75	3.69	4.32	110	73	4.70	4.29
E10	20	150	3.00	5.01	140	79	4.94	4.37
E11	40	175	3.69	5.16	150	200	5.01	5.30
F1	80	50	4.38	3.91	180	83	5.19	4.42
F2	30	67	3.40	4.20	150	47	5.01	3.85
F3	30	67	3.40	4.20	170	24	5.14	3.18
F4	---	---	-----	----	130	38	4.87	3.64
F5	40	50	3.69	3.91	100	50	4.61	3.91
F6	40	50	3.69	3.91	120	58	4.79	4.06
F7	30	67	3.40	4.20	90	56	4.50	4.03
F8	---	---	-----	----	120	42	4.79	3.74
F9	300	10	5.70	2.30	100	90	4.61	4.50
F10	40	50	3.69	3.91	140	86	4.94	4.45
F11	140	64	4.94	4.16	200	95	5.30	4.55
G1	20	250	3.00	5.52	140	79	4.94	4.37
G2	40	50	3.69	3.91	160	50	5.08	3.91
G3	20	150	3.00	5.01	200	30	5.30	3.40
G4	60	33	4.09	3.50	140	36	4.94	3.58
G5	40	50	3.69	3.91	130	38	4.87	3.64
G6	50	40	3.91	3.69	170	53	5.14	3.97
G7	60	50	4.09	3.91	130	46	4.87	3.83
G8	20	100	3.00	4.61	110	64	4.70	4.16
G9	40	50	3.69	3.91	150	40	5.01	3.69
G10	20	150	3.00	5.01	160	56	5.08	4.03
G11	70	57	4.25	4.04	180	83	5.19	4.42
H1	30	100	3.40	4.61	110	82	4.70	4.41
H2	30	67	3.40	4.20	200	40	5.30	3.69
H3	200	10	5.30	2.30	700	10	6.55	2.30

Continued

TABLE 4: Initial Intensities and Decontamination Coefficient for Trial 4 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
H4	200	10	5.30	2.30	600	22	6.40	3.09
H5	90	22	4.50	3.09	300	27	5.70	3.30
H6	90	44	4.50	3.78	200	45	5.30	3.81
H7	50	60	3.91	4.09	110	64	4.70	4.16
H8	50	40	3.91	3.69	130	54	4.87	3.99
H9	80	100	4.38	4.61	400	30	5.99	3.40
H10	200	20	5.30	3.00	300	50	5.70	3.91
H11	130	54	4.87	3.99	400	60	5.99	4.09
I1	50	60	3.91	4.09	20	400	3.00	5.99
I2	60	50	4.09	3.91	300	27	5.70	3.30
I3	1700	2	7.44	0.69	1200	12	7.09	2.48
I4	1000	5	6.91	1.61	1200	15	7.09	2.71
I5	100	40	4.61	3.69	900	13	6.80	2.56
I6	100	40	4.61	3.69	400	25	5.99	3.22
I7	120	25	4.70	3.22	200	40	5.30	3.69
I8	60	50	4.09	3.91	200	50	5.30	3.91
I9	70	43	4.25	3.76	300	47	5.70	3.85
I10	70	57	4.25	4.04	300	50	5.70	3.91
I11	200	50	5.30	3.91	500	60	6.21	4.09
J1	40	175	3.69	5.16	160	81	5.08	4.39
J2	80	38	4.38	3.64	300	33	5.70	3.50
J3	500	6	6.21	1.79	800	18	6.68	2.89
J4	1600	3	7.38	1.10	1300	23	7.17	3.14
J5	1200	8	7.09	2.08	1500	14	7.31	2.64
J6	200	15	5.30	2.71	800	26	6.68	3.26
J7	---	---	----	----	600	33	6.40	3.50
J8	30	133	3.40	4.89	200	95	5.30	4.55
J9	30	167	3.40	5.12	200	95	5.30	4.55
J10	30	133	3.40	4.89	200	75	5.30	4.32
J11	40	75	3.69	4.32	190	100	5.25	4.61
K1	80	38	4.38	3.64	170	53	5.14	3.97
K2	130	54	4.87	3.99	220	59	5.39	4.08
K3	90	44	4.50	3.78	300	50	5.70	3.91
K4	400	10	5.99	2.30	900	19	6.80	2.94
K5	400	10	5.99	2.30	800	15	6.68	2.71
K6	300	13	5.70	2.56	600	28	6.40	3.33
K7	100	40	4.61	3.69	300	33	5.70	3.50
K8	100	30	4.61	3.40	300	67	5.70	4.20

Continued

TABLE 4: Initial Intensities and Decontamination Coefficient for Trial 4 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
K9	300	100	5.70	4.61	300	17	5.70	2.83
K10	70	43	4.25	3.76	90	190	4.50	5.25
K11	400	50	5.99	3.91	300	100	5.70	4.61

$\Sigma x_i = 480.71$ $\Sigma y_i = 453.74$ $\Sigma x_i = 642.91$ $\Sigma x_i^2 = 3489.9607$

$\Sigma x_i^2 = 2114.4211$ $\Sigma y_i^2 = 1871.5794$ $\Sigma y_i = 451.47$ $\Sigma y_i^2 = 1734.7793$

$\Sigma x_i y_i = 1760.1248$ $\Sigma x_i y_i = 2354.5560$

$N = 117$ $N = 121$

TABLE 5: Initial Intensities and Decontamination Coefficient for Trial 5 at the ground and three - foot levels

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
A1	80	50	4.38	3.91	190	105	5.25	4.65
A2	80	13	4.38	2.56	180	83	5.19	4.42
A3	30	67	3.40	4.20	100	90	4.61	4.50
A4	50	100	3.91	4.61	100	80	4.61	4.38
A5	70	57	4.25	4.04	170	176	5.14	5.17
A6	200	10	5.30	2.30	600	10	6.40	2.30
A7	40	50	3.69	3.91	120	58	4.79	4.06
A8	30	133	3.40	4.89	90	88	4.50	4.48
A9	130	54	4.87	3.99	170	71	5.14	4.26
A10	40	125	3.69	4.83	300	133	5.70	4.89
A11	20	200	3.00	5.30	80	138	4.38	4.93
B1	60	833	4.09	6.73	170	353	5.14	5.87
B2	40	75	3.69	4.32	110	127	4.70	4.84
B3	40	50	3.69	3.91	100	90	4.61	4.50
B4	60	50	4.09	3.91	120	58	4.79	4.06
B5	200	20	5.30	3.00	200	55	5.30	4.01
B6	40	125	3.69	4.83	200	65	5.30	4.17
B7	50	200	3.91	5.30	110	273	4.70	5.61
B8	40	50	3.69	3.91	110	100	4.70	4.61
B9	40	75	3.69	4.32	110	64	4.70	4.16
B10	50	40	3.91	3.69	130	77	4.87	4.34
B11	20	100	3.00	4.61	110	91	4.70	4.51
C1	30	4000	3.40	8.29	100	600	4.61	6.40
C2	30	133	3.40	4.89	100	200	4.61	5.30
C3	30	133	3.40	4.89	80	125	4.38	4.83
C4	40	100	3.69	4.61	80	125	4.38	4.83
C5	40	50	3.69	3.91	90	88	4.50	4.48
C6	50	20	3.91	3.00	100	70	4.61	4.25
C7	40	100	3.69	4.61	150	200	5.01	5.30
C8	30	67	3.40	4.20	140	86	4.94	4.45
C9	30	67	3.40	4.20	150	47	5.01	3.85
C10	40	50	3.69	3.91	230	74	5.44	4.30
C11	30	200	3.40	5.30	200	150	5.30	5.01
D1	40	150	3.69	5.01	120	117	4.79	4.76
D2	20	200	3.00	5.30	110	118	4.70	4.77
D3	40	75	3.69	4.32	110	73	4.70	4.29
D4	40	75	3.69	4.32	100	80	4.61	4.38
D5	40	75	3.69	4.32	80	100	4.38	4.61
D6	20	150	3.00	5.01	80	100	4.38	4.61

Continued

TABLE 5: Initial Intensities and Decontamination Coefficient for Trial 5 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
D7	50	60	3.91	4.09	400	20	5.99	3.00
D8	60	50	4.09	3.91	300	33	5.70	3.50
D9	50	40	3.91	3.69	300	23	5.70	3.14
D10	90	33	4.50	3.50	500	22	6.21	3.09
D11	700	9	6.55	2.20	1000	100	6.91	4.61
E1	50	100	3.91	4.61	130	231	4.87	5.44
E2	30	133	3.40	4.89	100	100	4.61	4.61
E3	40	75	3.69	4.32	80	88	4.38	4.48
E4	30	100	3.40	4.61	90	88	4.50	4.48
E5	30	300	3.40	5.70	120	167	4.79	5.12
E6	40	75	3.69	4.32	120	58	4.79	4.06
E7	100	40	4.61	3.69	300	63	5.70	4.14
E8	140	14	4.94	2.64	200	50	5.30	3.91
E9	2000	1	7.60	0.00	1500	4	7.31	1.39
E10	80	25	4.38	3.22	200	50	5.30	3.91
E11	--	--	----	----	700	186	6.55	5.23
F1	50	80	3.91	4.38	140	214	4.94	5.37
F2	40	100	3.69	4.61	110	100	4.70	4.61
F3	20	100	3.00	4.61	100	90	4.61	4.50
F4	40	50	3.69	3.91	90	88	4.50	4.48
F5	50	40	3.91	3.69	40	250	3.69	5.52
F6	50	40	3.91	3.69	160	56	5.08	4.01
F7	80	50	4.38	3.91	160	63	5.08	4.14
F8	130	8	4.87	2.08	200	40	5.30	3.69
F9	200	5	5.30	1.61	300	23	5.70	3.14
F10	110	9	4.70	2.20	300	17	5.70	2.83
F11	60	33	4.09	3.50	200	40	5.30	3.69
G1	50	40	3.91	3.69	210	48	5.35	3.87
G2	30	133	3.40	4.89	150	47	5.01	3.85
G3	40	75	3.69	4.32	120	58	4.79	4.06
G4	50	60	3.91	4.09	110	64	4.70	4.16
G5	40	50	3.69	3.91	130	62	4.87	4.13
G6	70	29	4.25	3.37	130	92	4.87	4.52
G7	150	60	5.01	4.09	200	70	5.30	4.25
G8	60	50	4.09	3.91	100	100	4.61	4.61
G9	200	15	5.30	2.71	400	8	5.99	2.08
G10	70	43	4.25	3.76	100	50	4.61	3.91
G11	20	150	3.00	5.01	110	36	4.70	3.58
H1	60	33	4.09	3.50	200	65	5.30	4.17

Continued

TABLE 5: Initial Intensities and Decontamination Coefficient for Trial 5 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
H2	60	33	4.09	3.50	200	40	5.30	3.69
H3	70	29	4.25	3.37	140	50	4.94	3.91
H4	70	29	4.25	3.37	200	35	5.30	3.56
H5	40	50	3.69	3.91	100	80	4.61	4.38
H6	60	33	4.09	3.50	170	88	5.14	4.48
H7	—	—	----	----	1000	170	6.91	5.14
H8	110	36	4.70	3.58	200	70	5.30	4.25
H9	400	2	5.99	0.69	700	9	6.55	2.20
H10	300	3	5.70	1.10	300	20	5.70	3.00
H11	50	20	3.91	3.00	1700	3	7.44	1.10
I1	---	---	----	----	1600	6	7.38	1.79
I2	190	11	5.25	2.40	400	20	5.99	3.00
I3	190	11	5.25	2.40	400	18	5.99	2.89
I4	30	67	3.40	4.20	200	30	5.30	3.40
I5	20	100	3.00	4.61	200	35	5.30	3.56
I6	50	40	3.91	3.69	200	65	5.30	4.17
I7	40	100	3.69	4.61	200	80	5.30	4.38
I8	40	100	3.69	4.61	200	45	5.30	3.81
I9	70	57	4.25	4.04	200	50	5.30	3.91
I10	200	25	5.30	3.22	300	33	5.70	3.50
I11	190	11	5.25	2.40	200	35	5.30	3.56
J1	40	100	3.69	4.61	700	19	6.55	2.94
J2	120	25	4.79	3.22	600	3	6.40	1.10
J3	200	15	5.30	2.71	700	13	6.55	2.56
J4	30	100	3.40	4.61	200	40	5.30	3.69
J5	50	40	3.91	3.69	200	35	5.30	3.56
J6	30	100	3.40	4.61	200	50	5.30	3.91
J7	30	100	3.40	4.61	200	45	5.30	3.81
J8	30	67	3.40	4.20	200	45	5.30	3.81
J9	50	140	3.91	4.94	200	50	5.30	3.91
J10	200	150	5.30	5.01	200	150	5.30	5.01
J11	30	67	3.40	4.20	110	91	4.70	4.57
K1	50	100	3.91	4.61	140	100	4.94	4.61
K2	60	50	4.09	3.91	200	50	5.30	3.91
K3	300	10	5.70	2.30	400	20	5.99	3.00
K4	500	4	6.21	1.39	600	8	6.40	2.08
K5	70	29	4.25	3.37	150	33	5.01	3.50
K6	60	33	4.09	3.50	100	70	4.61	4.25
K7	70	43	4.25	3.76	130	54	4.87	3.99

Continued

TABLE 5: Initial Intensities and Decontamination Coefficient for Trial 5 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
K8	10	200	2.30	5.30	20	450	3.00	6.11
K9	40	75	3.69	4.32	110	136	4.70	4.91
K10	70	71	4.25	4.26	100	200	4.61	5.30
K11	50	40	3.91	3.69	100	80	4.61	4.38

$\Sigma x_i = 481.08$ $\Sigma y_i = 463.01$ $\Sigma x_i = 627.57$ $\Sigma y_i = 494.95$

$\Sigma x_i^2 = 2037.1234$ $\Sigma y_i^2 = 1958.8849$ $\Sigma x_i^2 = 3316.4087$ $\Sigma y_i^2 = 2129.4909$

$\Sigma x_i y_i = 1805.9250$ $\Sigma x_i y_i = 2510.3736$

N = 118 N = 121

TABLE 6: Initial Intensities and Decontamination Coefficient for Trial 6 at the ground and three - foot levels

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
A1	80	62	4.38	4.14	200	75	5.30	4.32
A2	60	50	4.09	3.91	190	63	5.25	4.14
A3	110	27	4.70	3.30	300	43	5.70	3.76
A4	80	38	4.38	3.64	200	60	5.30	4.09
A5	50	60	3.91	4.09	130	77	4.87	4.34
A6	50	60	3.91	4.09	140	57	4.94	4.04
A7	30	100	3.40	4.61	150	67	5.01	4.20
A8	40	100	3.69	4.61	150	87	5.01	4.47
A9	300	27	5.70	3.30	500	38	6.21	3.64
A10	400	175	5.99	5.16	500	120	6.21	4.79
A11	80	88	4.38	4.48	150	133	5.01	4.89
B1	40	50	3.69	3.91	180	67	5.19	4.20
B2	50	80	3.91	4.38	180	167	5.19	5.12
B3	50	40	3.91	3.69	300	40	5.70	3.69
B4	60	67	4.09	4.20	300	27	5.70	3.30
B5	20	100	3.00	4.61	110	45	4.70	3.81
B6	20	100	3.00	4.61	90	56	4.50	4.01
B7	20	100	3.00	4.61	110	73	4.70	4.29
B8	40	50	3.69	3.91	140	57	4.94	4.04
B9	300	7	5.70	1.95	400	28	5.99	3.33
B10	40	50	3.69	3.91	200	65	5.30	4.17
B11	20	750	3.00	6.62	90	189	4.50	5.24
C1	80	75	4.38	4.32	300	37	5.70	3.61
C2	300	10	5.70	2.30	500	12	6.21	2.48
C3	40	75	3.69	4.32	210	29	5.35	3.37
C4	40	75	3.69	4.32	210	29	5.35	3.37
C5	40	75	3.69	4.32	130	38	4.87	3.64
C6	40	75	3.69	4.32	90	56	4.50	4.03
C7	40	75	3.69	4.32	110	45	4.70	3.81
C8	40	75	3.69	4.32	150	40	5.01	3.69
C9	60	50	4.09	3.91	130	38	4.87	3.64
C10	40	75	3.69	4.32	100	50	4.61	3.91
C11	30	100	3.40	4.61	60	100	4.09	4.61
D1	--	---	-----	----	300	133	5.70	4.89
D2	900	3	6.80	1.10	1400	5	7.24	1.61
D3	20	100	3.00	4.61	180	33	5.19	3.50
D4	40	75	3.69	4.32	110	55	4.70	4.01
D5	20	100	3.00	4.61	110	45	4.70	3.81
D6	40	75	3.69	4.32	100	50	4.61	3.91

Continued

TABLE 6: Initial Intensities and Decontamination Coefficient for Trial 6 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
D7	20	150	3.00	5.01	110	27	4.70	3.30
D8	110	18	4.70	2.89	300	13	5.70	2.56
D9	40	75	3.69	4.32	220	14	5.39	2.64
D10	20	150	3.00	5.01	100	60	4.61	4.09
D11	40	75	3.69	4.32	90	56	4.50	4.03
E1	—	—	----	----	1800	10	7.50	2.30
E2	300	3	5.70	1.10	400	15	5.99	2.71
E3	50	20	3.91	3.00	170	29	5.14	3.37
E4	30	67	3.40	4.20	130	46	4.87	3.83
E5	30	67	3.40	4.20	100	50	4.61	3.91
E6	30	67	3.40	4.20	100	50	4.61	3.91
E7	40	25	3.69	3.22	130	31	4.87	3.43
E8	400	2	5.99	0.69	600	7	6.40	1.95
E9	110	9	4.70	2.20	300	20	5.70	3.00
E10	40	25	3.69	3.22	110	45	4.70	3.81
E11	30	67	3.40	4.20	70	71	4.25	4.26
F1	70	43	4.25	3.76	180	56	5.19	4.03
F2	40	75	3.69	4.32	170	41	5.14	3.71
F3	10	300	2.30	5.70	200	35	5.30	3.56
F4	20	100	3.00	4.61	140	36	4.94	3.58
F5	40	50	3.69	3.91	100	50	4.61	3.91
F6	20	150	3.00	5.01	130	38	4.87	3.64
F7	40	75	3.69	4.32	150	33	5.01	3.50
F8	80	25	4.38	3.22	190	26	5.25	3.26
F9	200	10	5.30	2.30	200	20	5.30	3.00
F10	60	50	4.09	3.91	90	56	4.50	4.03
F11	40	50	3.69	3.91	70	57	4.25	4.04
G1	30	33	3.40	3.50	140	43	4.94	3.76
G2	200	5	5.30	1.61	300	17	5.70	2.83
G3	80	25	4.38	3.22	600	7	6.40	1.95
G4	50	20	3.91	3.00	210	19	5.35	2.94
G5	100	10	4.61	2.30	350	11	5.86	2.40
G6	80	12	4.38	2.48	300	17	5.70	2.83
G7	90	22	3.09	3.09	160	25	5.08	3.22
G8	120	8	4.79	2.08	300	17	5.70	2.83
G9	—	—	----	----	1400	3	7.24	1.10
G10	—	—	----	----	200	20	5.30	3.00
G11	40	25	3.69	3.22	80	75	4.38	4.32
H1	20	100	3.00	4.61	130	38	4.87	3.64

Continued

TABLE 6: Initial Intensities and Decontamination Coefficient for Trial 6 (Continued)

Station Number	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
H2	50	40	3.91	3.69	210	19	5.35	2.94
H3	110	27	4.70	3.30	300	17	5.70	2.83
H4	50	40	3.91	3.69	190	16	5.25	2.77
H5	150	13	5.01	2.56	130	23	4.87	3.14
H6	160	12	5.08	2.48	300	17	5.70	2.83
H7	100	40	4.61	3.69	160	25	5.08	3.22
H8	30	67	3.40	4.20	140	29	4.94	3.37
H9	90	22	4.50	3.09	130	38	4.87	3.64
H10	90	22	4.50	3.09	120	42	4.79	3.74
H11	20	150	3.00	5.01	100	50	4.61	3.91
I1	50	40	3.91	3.69	100	60	4.61	4.09
I2	50	40	3.91	3.69	100	40	4.61	3.69
I3	30	67	3.40	4.20	100	30	4.61	3.40
I4	20	100	3.00	4.61	120	33	4.79	3.50
I5	30	67	3.40	4.20	120	33	4.79	3.50
I6	100	20	4.61	3.00	150	27	5.01	3.30
I7	200	10	5.30	2.30	200	20	5.30	3.00
I8	30	67	3.40	4.20	190	26	5.25	3.26
I9	30	67	3.40	4.20	120	42	4.79	3.74
I10	30	67	3.40	4.20	90	56	4.50	4.03
I11	20	100	3.00	4.61	80	75	4.38	4.32
J1	40	50	3.69	3.91	130	54	4.87	3.99
J2	60	33	4.09	3.50	130	31	4.87	3.43
J3	70	29	4.25	3.37	110	36	4.70	3.58
J4	30	67	3.40	4.20	90	44	4.50	3.78
J5	50	40	3.91	3.69	80	38	4.38	3.64
J6	30	67	3.40	4.20	80	38	4.38	3.64
J7	80	25	4.38	3.22	130	31	4.87	3.43
J8	400	5	5.99	1.61	500	6	6.21	1.80
J9	50	40	3.91	3.69	120	25	4.79	3.22
J10	40	50	3.69	3.91	90	78	4.50	4.36
J11	30	67	3.40	4.20	90	111	4.50	4.71
K1	300	3	5.70	1.10	400	12	5.99	2.48
K2	10	100	2.30	4.61	180	28	5.19	3.33
K3	20	50	3.00	3.91	70	57	4.25	4.04
K4	10	100	2.30	4.61	80	50	4.38	3.91
K5	10	100	2.30	4.61	80	50	4.38	3.91
K6	40	25	3.69	3.22	90	44	4.50	3.78
K7	30	33	3.40	3.50	150	1[illegible]	5.01	2.56
K8	30	33	3.40	3.50	140	14	4.94	2.64

Continued

TABLE 6: Initial Intensities and Decontamination Coefficient for Trial 6 (Continued)

Station Numbers	Ground Level				3 - foot level			
	100 I	100 D	x_i	y_i	100 I	100 D	x_i	y_i
K9	10	100	2.30	4.61	100	40	4.61	3.69
K10	40	25	3.69	3.22	130	31	4.87	3.43
K11	30	33	3.40	3.50	300	27	5.70	3.30

$\Sigma x_i = 456.72$ $\Sigma y_i = 439.52$ $\Sigma x_i = 617.23$ $\Sigma y_i = 430.82$

$\Sigma x_i^2 = 1868.4218$ $\Sigma y_i^2 = 1760.4374$ $\Sigma x_i^2 = 3195.3437$ $\Sigma y_i^2 = 1592.6326$

$\Sigma x_i y_i = 1639.8509$ $\Sigma x_i y_i = 2162.8130$

$N = 117$ $N = 121$

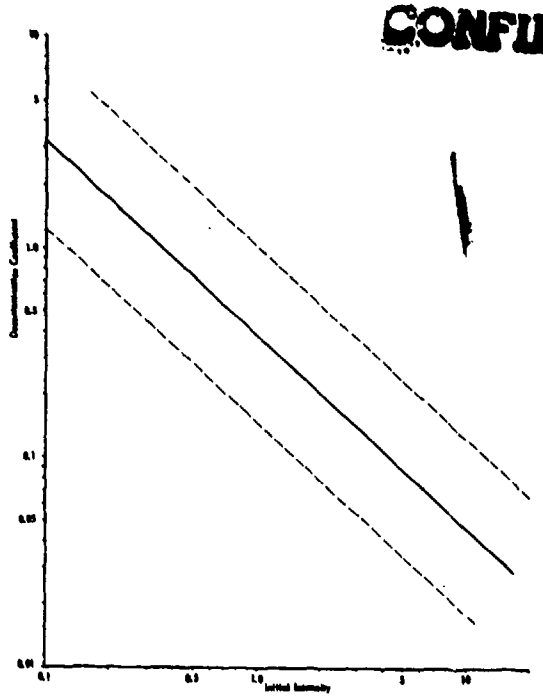

Fig. 1. – Decontamination coefficient versus initial intensity at ground level, Manual Removal, Trial 2.

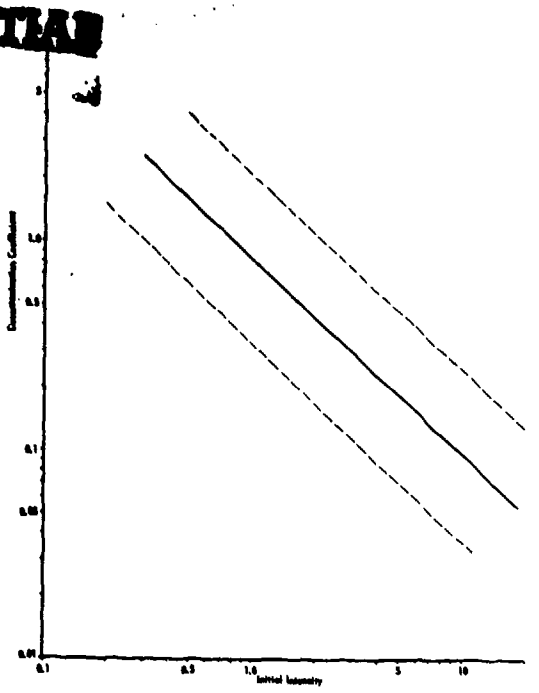

Fig. 2. – Decontamination coefficient versus initial intensity at three-foot level, Manual Removal, Trial 2.

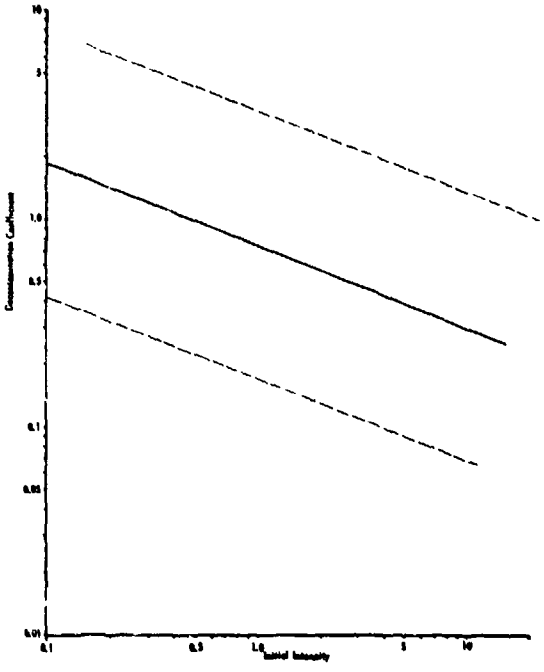

Fig. 3. – Decontamination coefficient versus initial intensity at ground level, Disk Harrow, Trial 3.

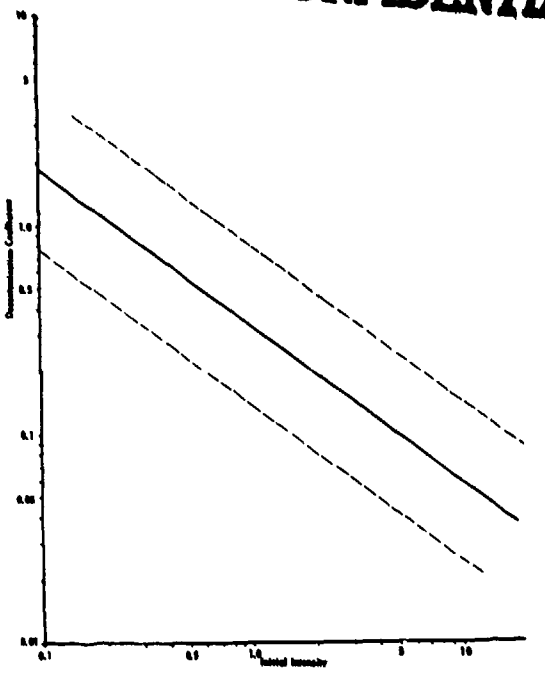

Fig. 4. – Decontamination coefficient versus initial intensity at ground level, Moldboard Plow, Trial 4.

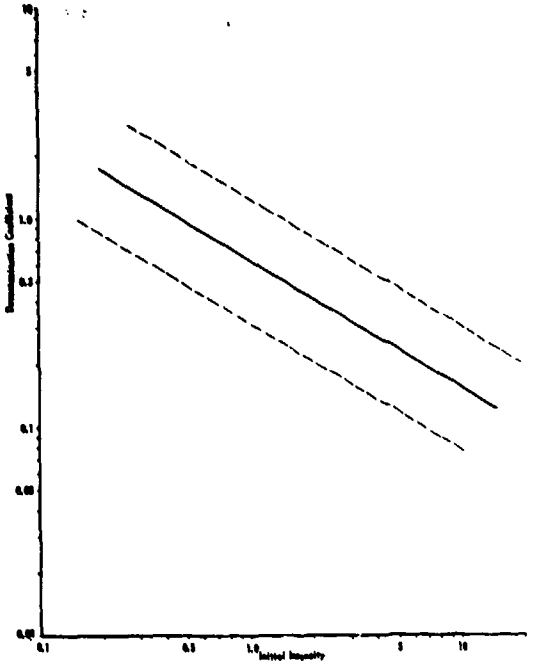

Fig. 5. – Decontamination coefficient versus initial intensity at three-foot level, Moldboard Plow, Trial 4.

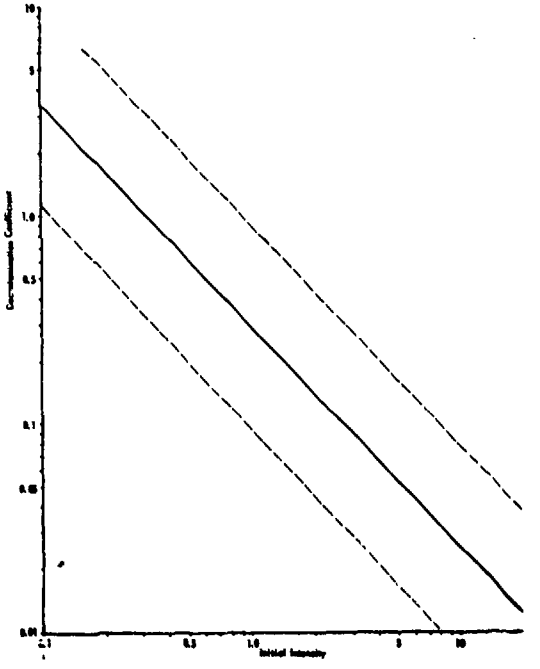

Fig. 6. – Decontamination coefficient versus initial intensity at ground level, Motor Grader, Trial 5.

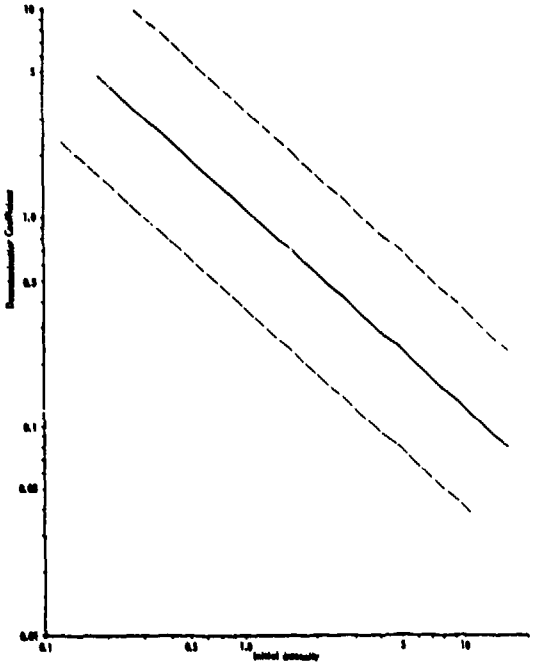

Fig. 7. – Decontamination coefficient versus initial intensity at three-foot level, Motor Grader, Trial 5.

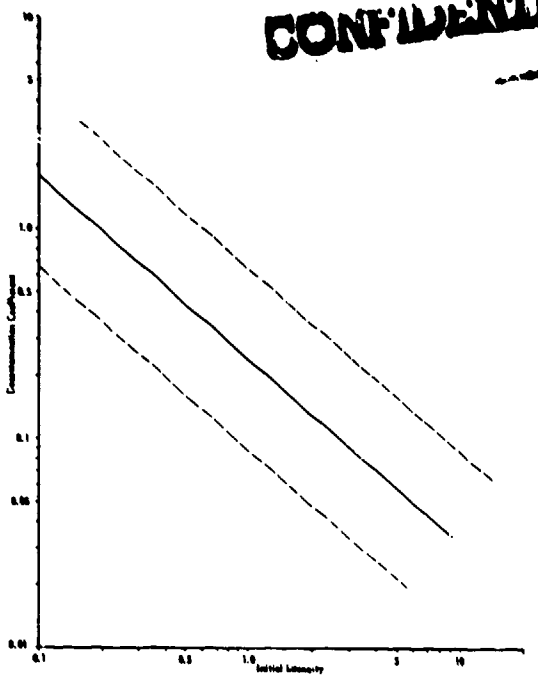

Fig. 8. – Decontamination coefficient versus initial intensity at ground level, Scraper, Trial 6.

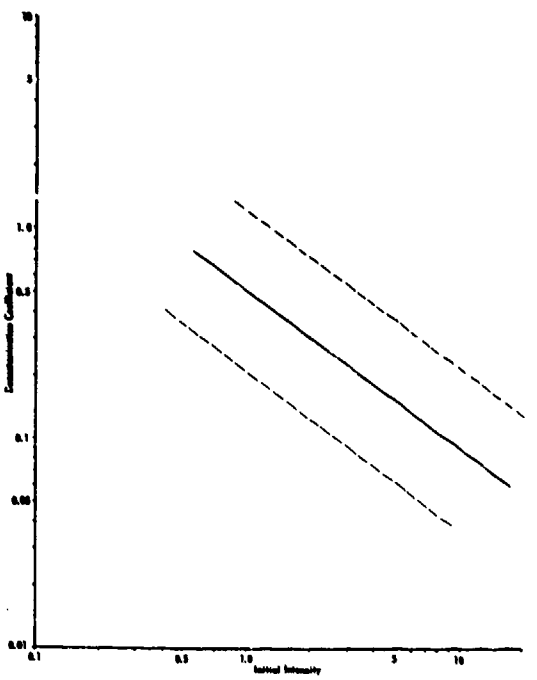

Fig. 9. – Decontamination coefficient versus initial intensity at three-foot level, Scraper, Trial 6.

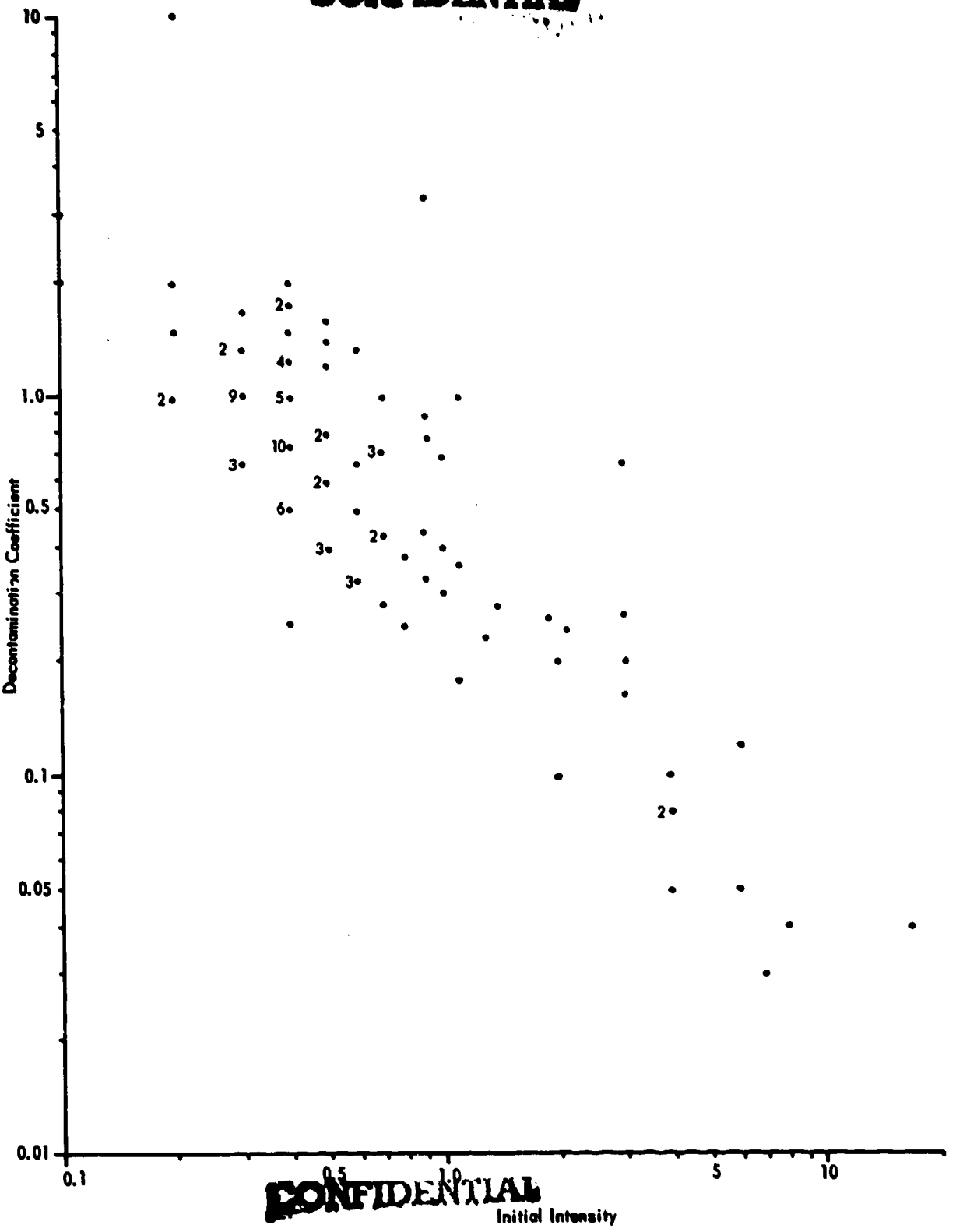

Fig. 10. – Scatter diagram of decontamination coefficient versus initial intensity at ground level, Manual Removal, Trial 2.

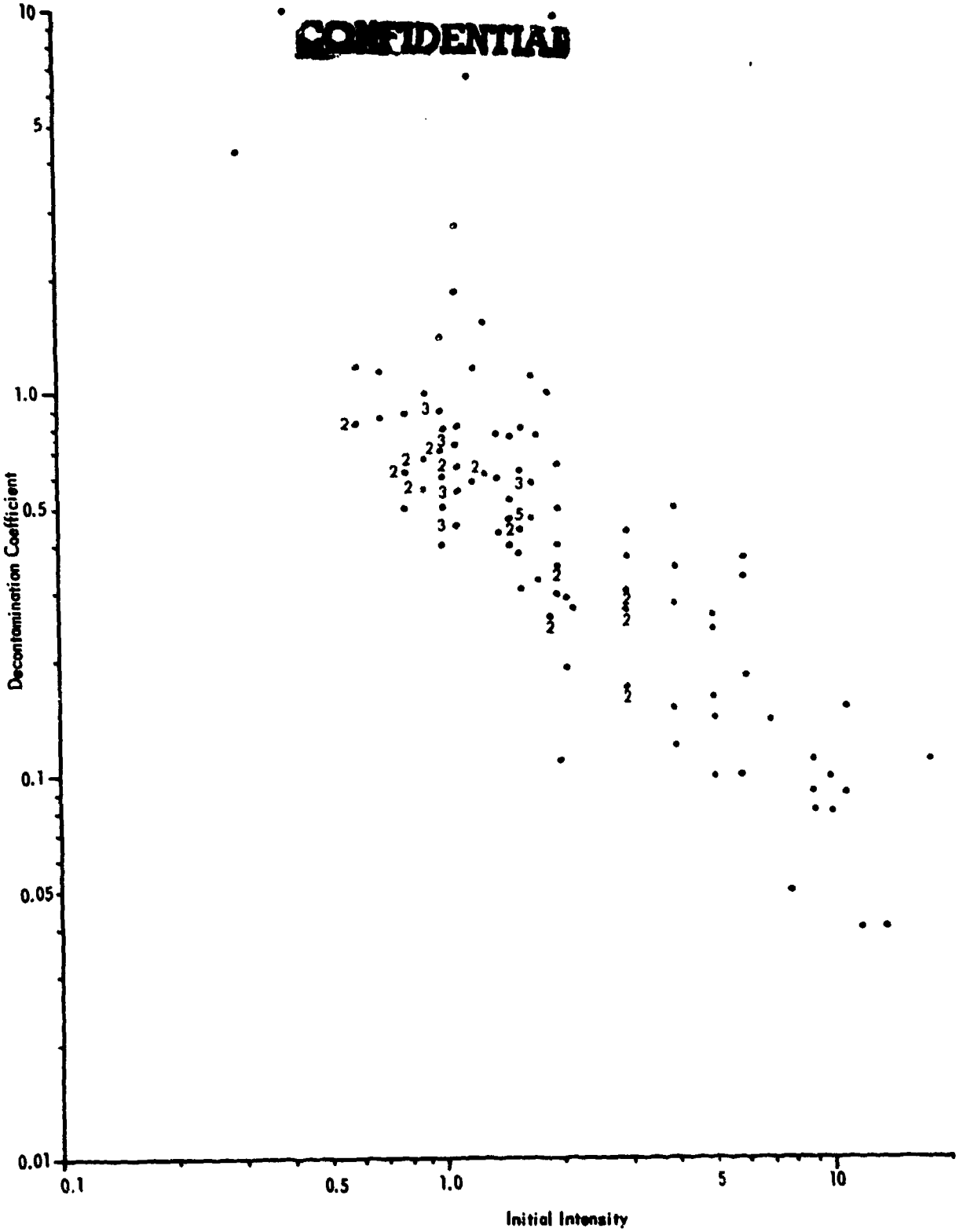

Fig. 11. – Scatter diagram of decontamination coefficient versus initial intensity at three-foot level, Manual Removal, Trial 2

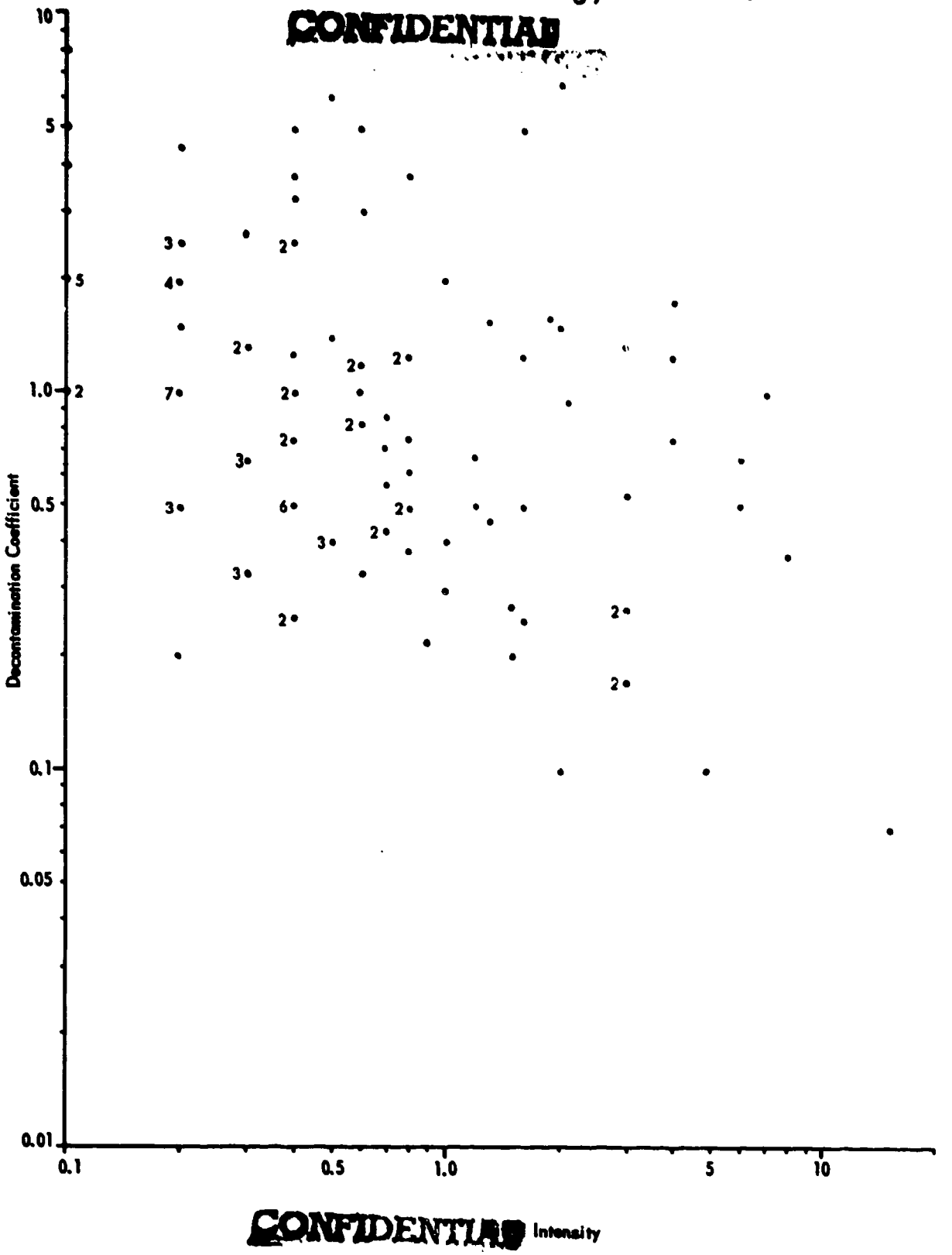

Fig. 12. – Scatter diagram of decontamination coefficient versus initial intensity at ground level, Disk Harrow, Trial 3.

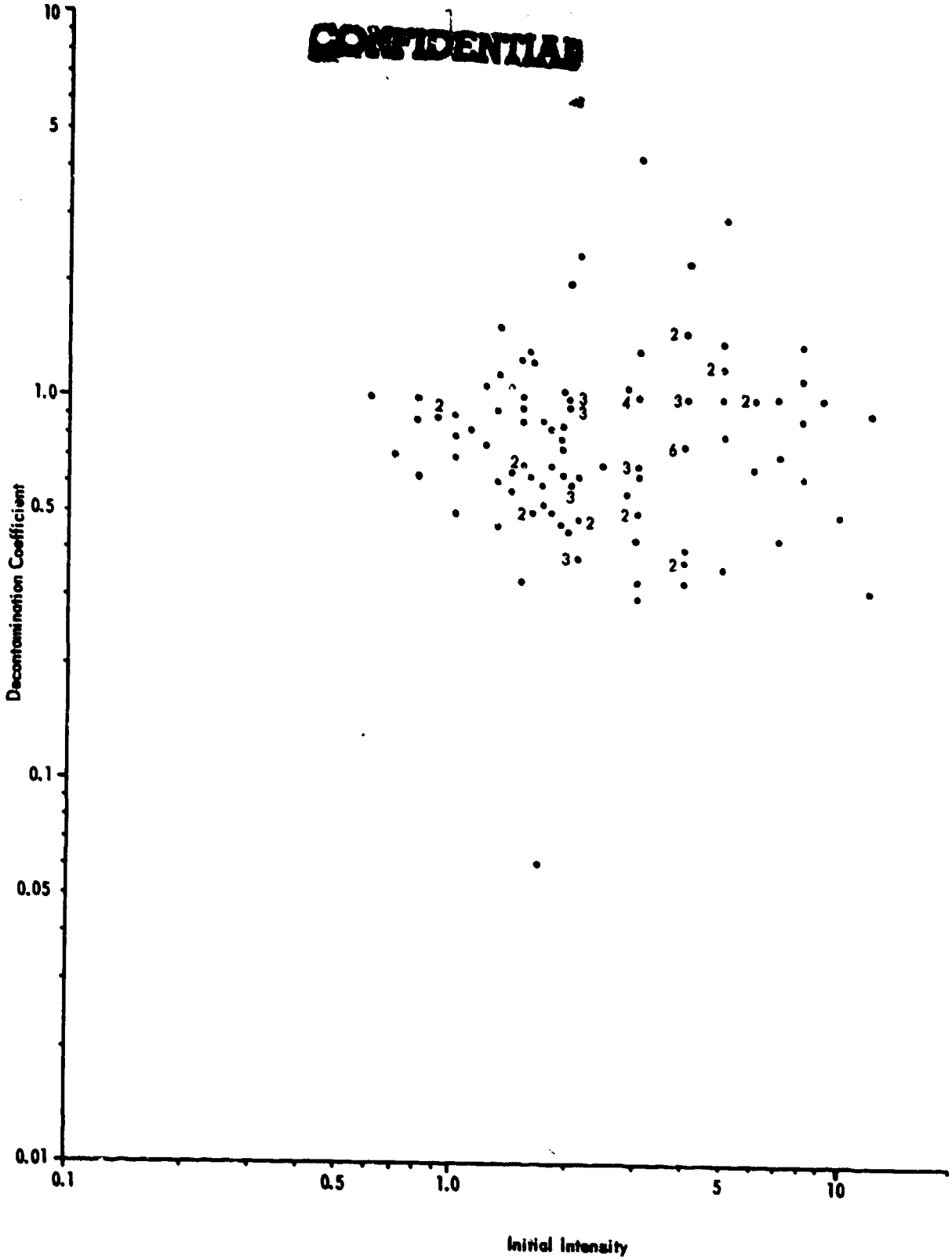

Fig. 13. – Scatter diagram of decontamination coefficient versus initial intensity at three-foot level, Disk Harrow, Trial 3.

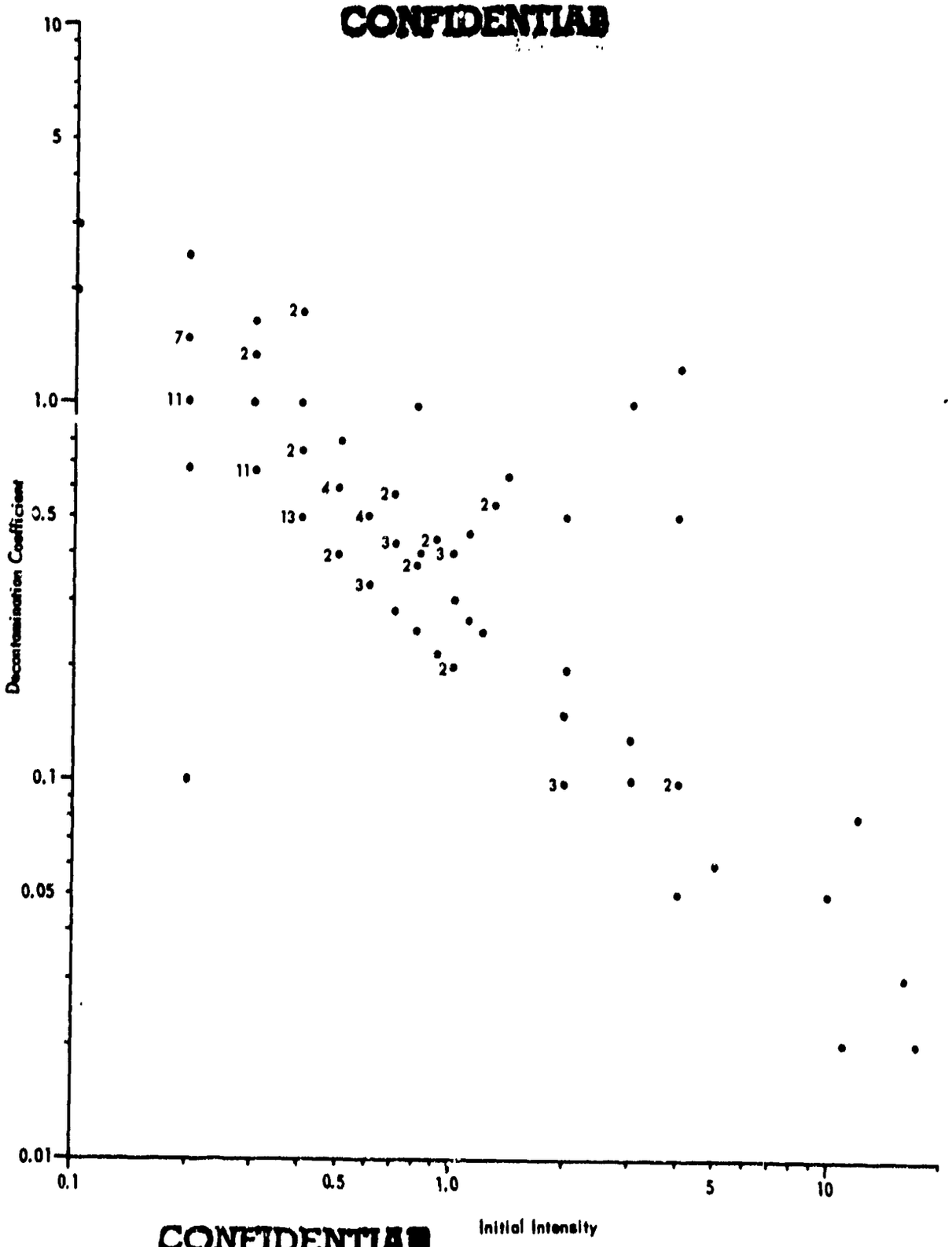

Fig. 14. – Scatter diagram of decontamination coefficient versus initial intensity at ground level, Moldboard Plow, Trial 4.

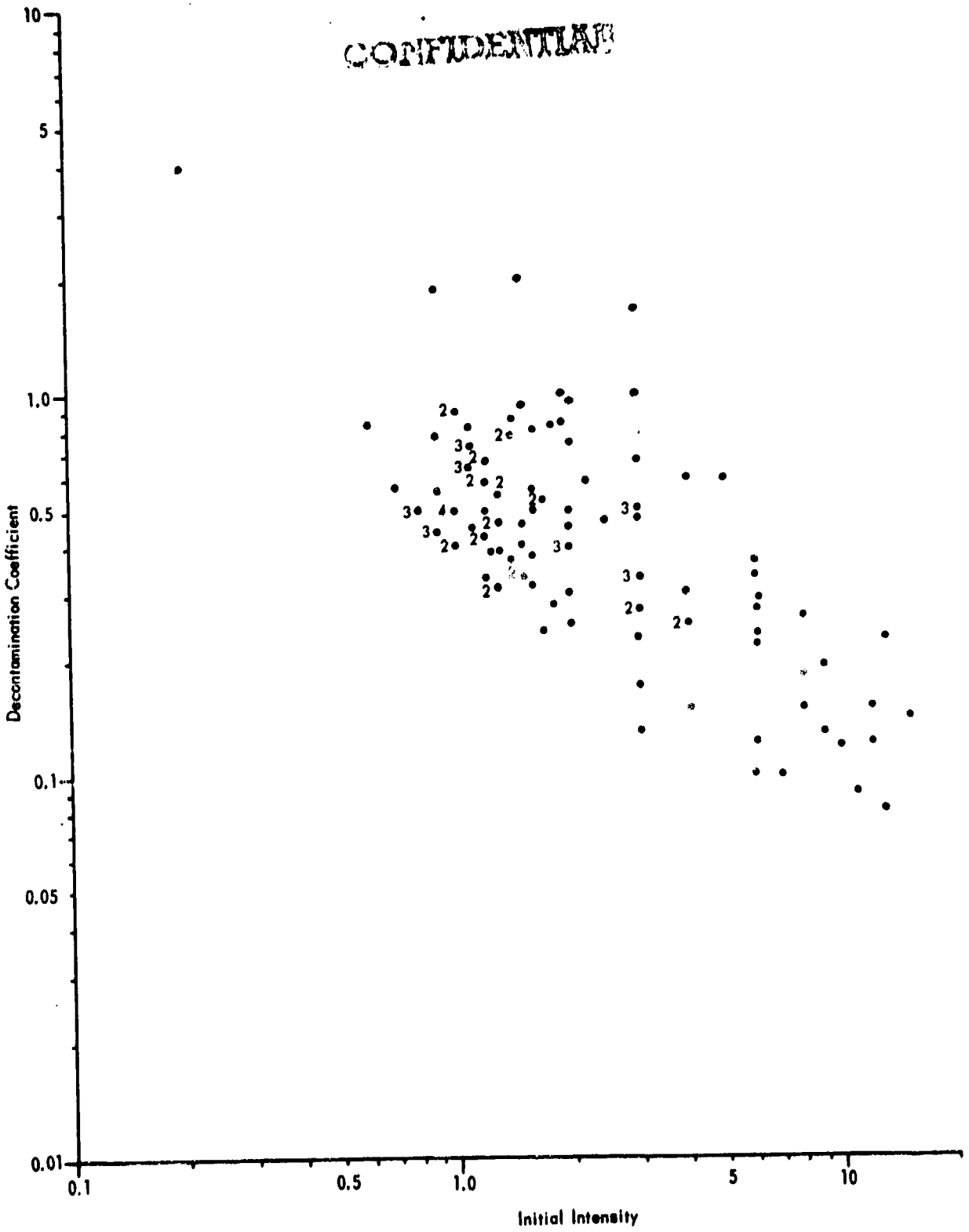

Fig. 15. – Scatter diagram of decontamination coefficient versus initial intensity at three-foot level, Moldboard Plow, Trial 4.

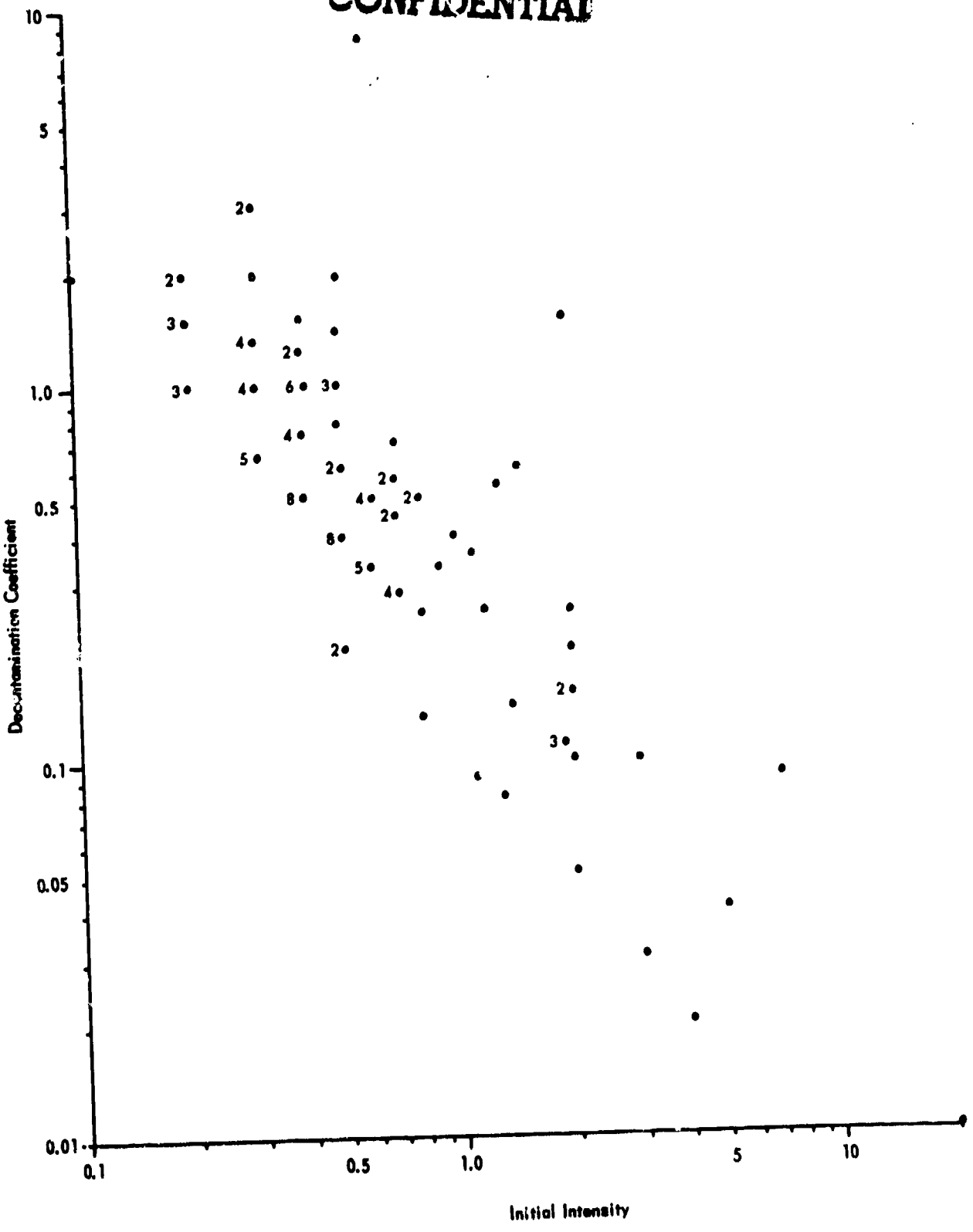

Fig. 16. – Scatter diagram of decontamination coefficient versus initial intensity at ground level, Motor Grader, Trial 5.

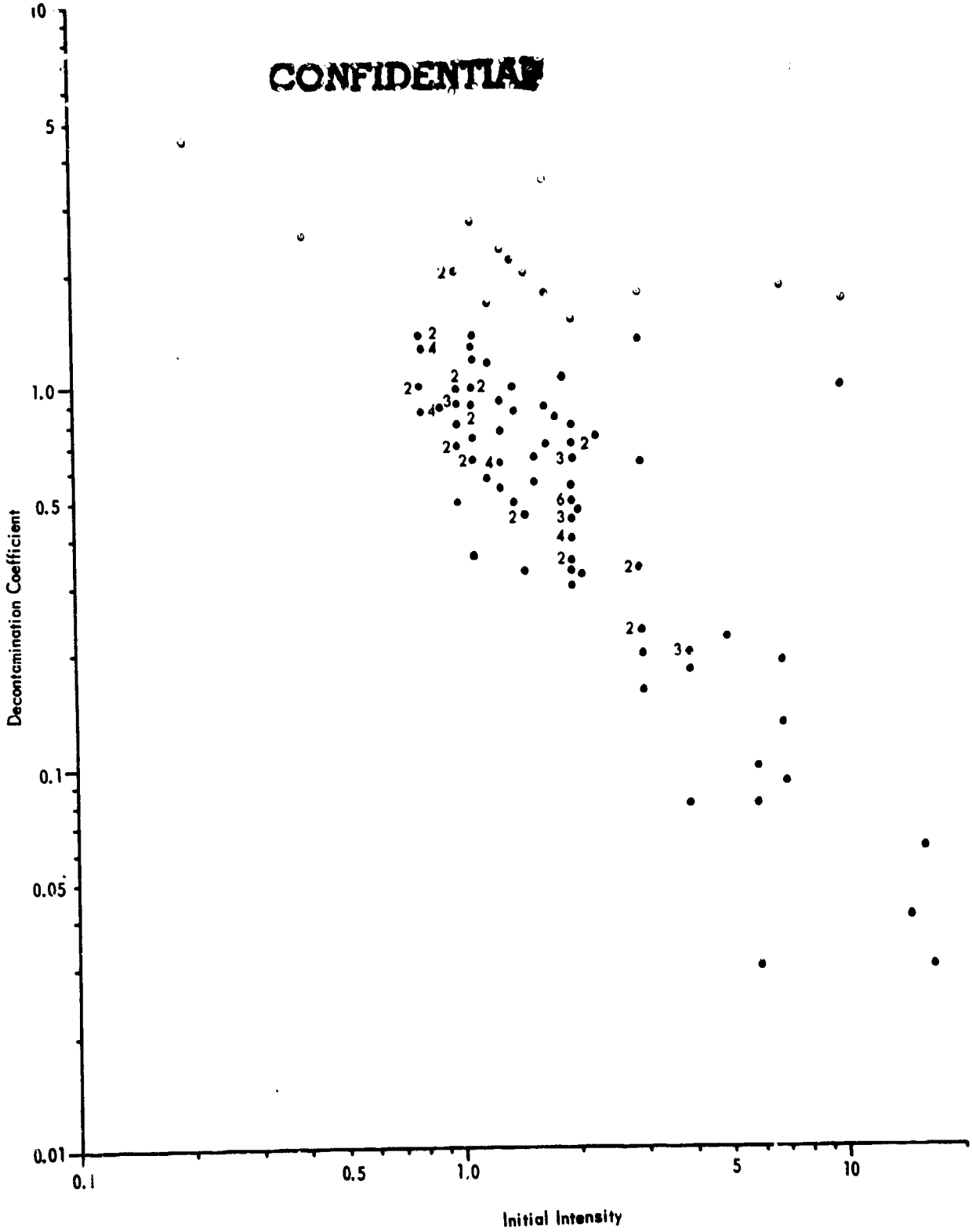

Fig. 17. – Scatter diagram of decontamination coefficient versus initial intensity at three-foot level, Motor Grader, Trial 5.

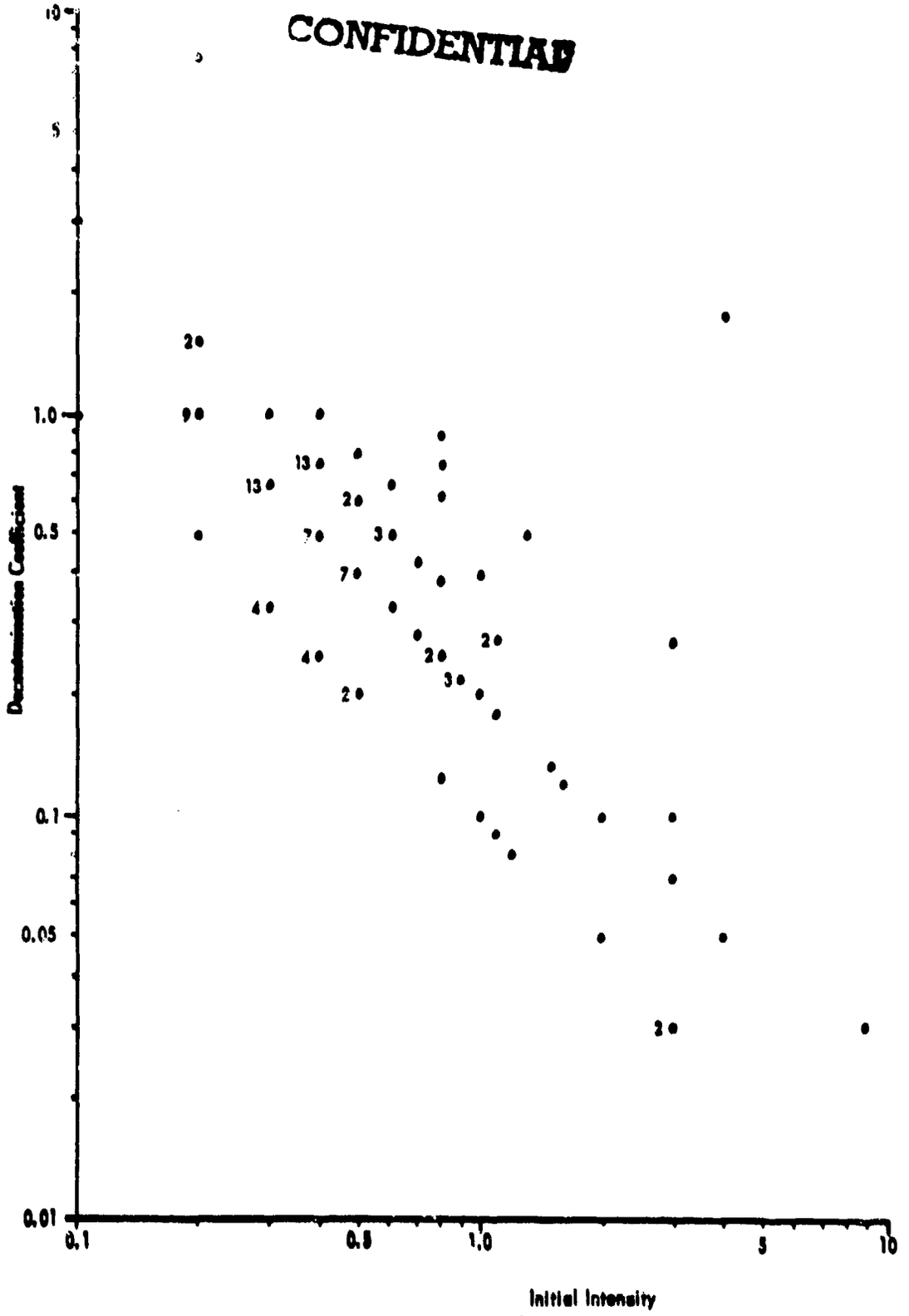

Fig. 18. – Scatter diagram of decontamination coefficient versus initial intensity at ground level, Scraper, Trial 6.

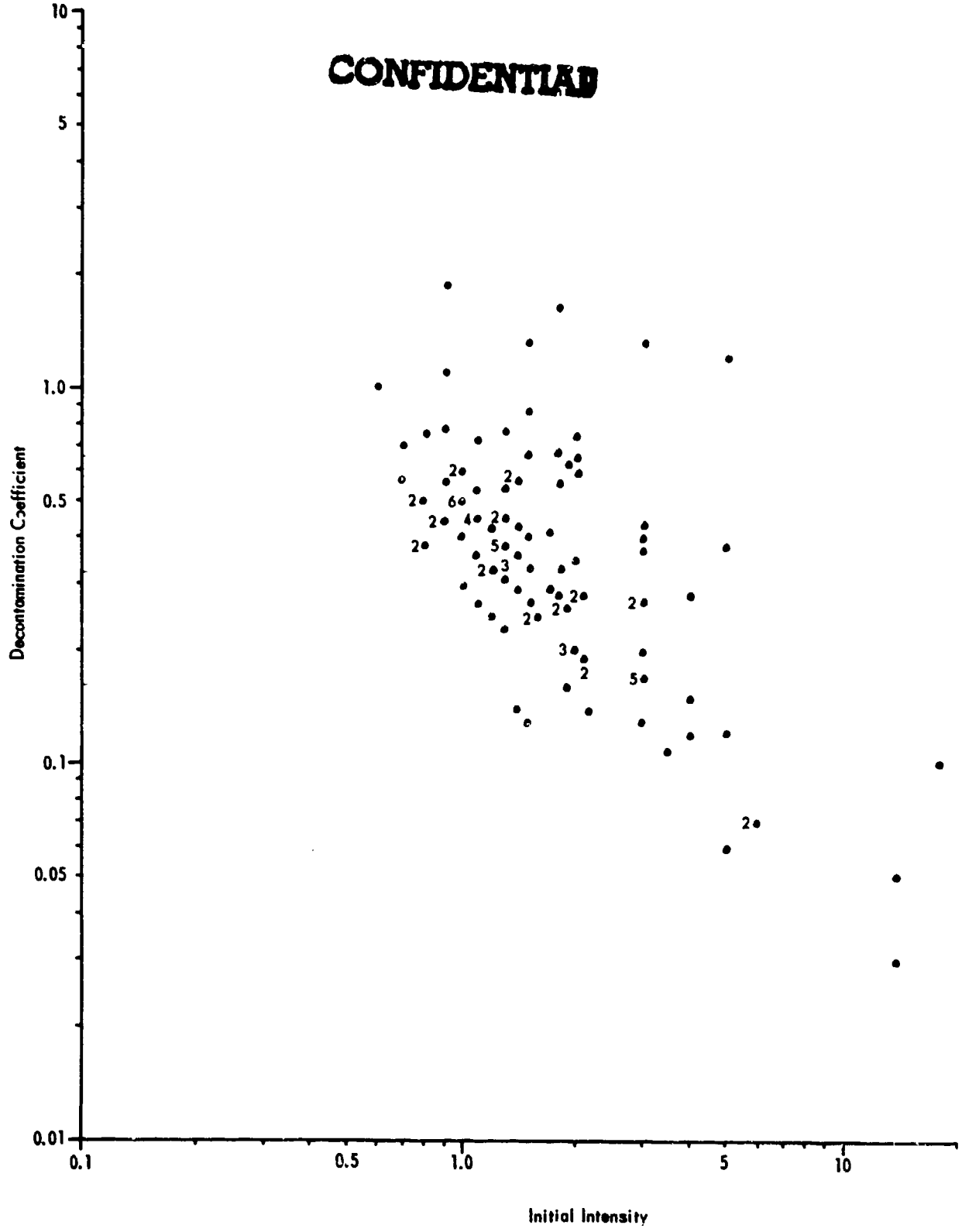

Fig. 19. – Scatter diagram of decontamination coefficient versus initial intensity at three-foot level, Scraper, Trial 6.

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APPENDIX IV

REMOVAL OF HOT SPOT

REMOVAL OF HOT SPOT

Two orthogonal diameters, labeled A and B, were established across the 200-foot circular hot area (Fig. 1). Arbitrary origins (O) were placed at the intersections of the perimeter and each diameter, and stations were oriented by the letter of the diameter and the distance in feet from the origin. Thus, station 51A is on diameter A at a distance 51 feet from OA, the station on the circumference of the circle. Radiation-intensity readings, taken two feet above terrain at various stations along the diameters both before and after the removal of the contaminated soil, are given in Table 1.

Table 1: Intensity Readings for Hot Spot

	DIAMETER A		DIAMETER B		
Station	Before Removal (mr/hr)	After Removal (mr/hr)	Station	Before Removal (mr/hr)	After Removal (mr/hr)
OA	20	10	OB	20	9
51A	50	22	32B	50	3
89A	100	20	50B	100	4
107A	200	44	62B	200	9
136A	350	26	73B	350	39
166A	200	18	78B	n.d.	160
180A	100	8	92B	400	11
198A	50	6	112B	350	25
220A	20	10	127B	200	15
			138B	100	11
			151B	50	13
			204B	20	7

The hot spot was removed by the scraper in 150 operating minutes. Of this time, it was estimated that 55 minutes were spent loading, 45 minutes hauling to the pit, 8 minutes dumping at the pit, and 42 minutes returning from the pit. Table 2 lists in detail the time data obtained in the removal operations.

TABLE 2: Operational Time Data collected in the removal of the Hot Spot

Operation Number	Time Completed	t_l* (seconds)	t_h* (seconds)	t_d* (seconds)	t_r* (seconds)	t_{dr}* (seconds)	t_{hdr}* (seconds)	t_{lhdr}* (seconds)
Start	1135							
1	1146							
2	1157							
3	1200							
4	1206	85	102	23	150			
idle	1208½							
5	1214	104					223	
6	1218½	52			84	102		
7	1222½	55	85	9	90			
8	1227½	86	79		63			
9	1231½	67					182	
10	1236	86					187	
11	1240 3/4	71					183	
12	1246½	68					277	
13	1250½	55					180	
14	1255	63					188	
15	1259 3/4	69					213	
16	1304 3/4							305
17	1309¼							253
18	1317¼							473
19	1321½							255
20	1325 3/4							260
21	1329 3/4							236
22	1333 3/4							238
23	1337 3/4							245

Continued

*t_l - time required to load, t_h-time required to haul; t_d-time required to dump t_r-time required to return t_{dr}-time required to dump and return; t_{hdr}-time required to haul, dump, and return t_{lhdr} time required to load, haul, dump, and return.

TABLE 2: Operational Time Data collected in the removal of the Hot Spot (Continued)

Operation Number	Time Completed	t_l* (seconds)	t_h* (seconds)	t_d* (seconds)	t_r* (seconds)	t_{dr}* (seconds)	t_{hdr}* (seconds)	t_{lhdr}* (seconds)
24**	1342½							340
25**	1349							310
26**	1354							300
27**	1359							285
idle	1404							
28**	n.d.							
**	1412							

**Operations 24 thru 28: two loading passes.

APPENDIX V

DISPOSAL PIT

DISPOSAL PIT

A 70-foot square pit, three feet in depth, was located approximately ½ mile from the center of Target 9, as shown in Figure 1 of the text. The location of the grid stakes within the pit is also shown.

Five surveys were made in the course of the test (Table 1). The pit was first surveyed when digging was approximately half completed. At the time of this survey there was a mound of contaminated soil from the high-intensity area (Area 1) along the west bank of the pit; soil removed from the pit was placed along the east bank near row E.

The second survey was made when the pit was about 90 per cent complete. The contaminated soil from Areas 5 and 6 had been added to the mound on the west bank.

A self-powered scraper was used to move the contaminated soil and spread it across the entire bottom of the pit in as even a layer as possible. The third survey was then made.

The fourth survey was made when enough of the uncontaminated soil had been spread over the pit to fill it to the three-quarter mark. The final survey was made after all the dirt removed from the pit had been returned to the pit.

The data from the surveys are given in Table 1. All gamma-intensity readings, in mr/hr, were taken three feet above the surface of the soil in the pit.

TABLE 1: Pit Readings

Station	GAMMA-INTENSITY READINGS (mr/hr) Survey Number				
	First	Second	Third	Fourth	Fifth
A1	12.0	4.0	Hot	0.9	2.0
A2	13.0	3.0	Hot	7.5	3.5
A3	8.0	1.4	Hot	20.0	2.0
A4	4.0	1.0	Hot	28.0	3.5
A5	3.5	0.3	Hot	9.0	2.0
A6	3.0	0.3	Hot	4.5	6.0
B1	3.5	1.8	2.0	3.0	0.7
B2	2.5	1.2	11.0	1.4	1.0
B3	2.0	0.8	Hot	30.0	0.45
B4	0.9	0.4	Hot	22.0	1.8
B5	0.7	0.4	Hot	6.0	2.0
B6	1.3	0.3	Hot	2.5	1.2
C1	1.2	0.6	4.0	1.2	1.0
C2	1.5	0.4	15.0	2.0	0.45
C3	1.3	0.3	Hot	27.0	0.2
C4	0.9	0.2	Hot	19.0	0.15
C5	0.7	0.6	9.0	4.5	0.2
C6	0.6	0.3	4.0	5.5	0.2
D1	0.7	0.7	19.0	6.5	0.2
D2	0.9	0.4	Hot	6.0	0.15
D3	0.6	0.2	13.0	1.5	0.2
D4	0.4	0.2	20.0	11.0	0.12
D5	0.3	1.2	Hot	20.0	0.1
D6	0.6	0.3	5.0	5.0	0.35
E1	0.4	0.3	3.0	0.4	0.2
E2	0.6	0.2	9.0	0.9	0.1
E3	0.6	0.2	15.0	0.8	0.12
E4	0.5	0.2	9.0	5.0	1.0
E5	0.5	0.2	Hot	20.0	0.25
E6	0.4	0.2	2.0	2.0	0.15

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JUN 30 2000

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Fort Belvoir, Virginia 22060-6218

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AD 202550: Study of the Post-Irradiation Syndrome in Humans

AD 332449: Preparation of O-Alkyl Alkylphosphonoazidothioates of the Type MEP (S) or N3

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Sincerely,

D. M. Schaeffer
Program Manager
Radiation Experiments Command Center